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THE MANAGEMENT OF DELAYED RESPONSE TO ARTIFICIAL RUPTURE OF THE MEMBRANES AS A METHOD OF INDUCING LABOUR.¹

By W. M. LEMMON,
Melbourne.

ARTIFICIAL RUPTURE of the membranes is the oldest method of inducing labour, as Soranus employed it and it was described in Denman's "Textbook of Midwifery" in 1802. Largely supplanted for many years by the bougie and tube methods, it has in the last twenty years gradually reestablished itself as the method of choice.

In 1944 a survey of the methods of inducing labour was carried out by the obstetrical staff of the Women's Hospital, Melbourne, with a statistical comparison between the methods of induction by means of the rectal insertion of tubes and by artificial rupture of the membranes. This survey covered the period from January, 1938, to December, 1943, there being 278 cases of tubal induction and 393 cases of artificial rupture of the membranes. The immeasurable superiority of the latter method was so strikingly demonstrated by the figures that tubal induction practically disappeared from the hospital records.

This superiority was evidenced not only in a lessened maternal mortality and morbidity and a lowered fetal mortality, but also in a reduction of the interval between induction of labour and delivery, this reduction steadily increasing as pregnancy advanced towards term.

In spite of this there are still a considerable number of cases in which the time interval between induction and delivery is so long that concern is felt as to the ultimate outcome.

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To assess the position satisfactorily certain questions must be answered: (i) In what percentages of cases is there undue delay in the completion of labour? (ii) How often does the method fail? (iii) Are the maternal mortality and morbidity materially increased in the group in which there is delay? (iv) Is the fetal mortality increased by delay? (v) Does artificial rupture of the membranes have any influence on the character of the labour? (vi) Is there any particular group of cases in which the method should not be employed? (vii) Is there any way in which the risks of delay to mother or fetus may be minimized?

TABLE I.
Results of Artificial Rupture of the Membranes.

Year.	Time Interval between Induction of Labour and Delivery.				Total.
	Under 24 Hours.	Under 48 Hours.	48-72 Hours (and Failures).	Over 72 Hours (and Failures).	
1939-40	32	8	0	2	42
1940-41	40	6	1	0	47
1941-42	46	8	6	3	63
1942-43	80	19	6	5	110
1943-44	115	16	12	10	153
1944-45	102	34	22	10	253
1945-46	146	35	17	15	213
1946-47 (10 months)	136	33	30	28	227
Total	737	159	94	73	1,113
Percentage	70.7	14.3	8.5	6.5	
	85%		15%		

In an attempt to answer these questions a survey of all cases of induction of labour by artificial rupture of the membranes in the Women's Hospital in the past eight years is presented—a total of 1113 cases.

¹ Read at a meeting of the Victorian Branch of the Royal College of Obstetricians and Gynaecologists on November 7 and 8, 1947.

Table I indicates the total numbers in each year, divided into four groups, the times at the head of each column indicating the time interval between induction of labour and delivery. In view of the fact that medicinal stimulation, including the administration of pituitrin or pitocin, has been an integral part of the induction in most of the cases, it was found impossible to be certain when labour commenced, so the interval between induction and delivery had to be chosen in spite of its obvious disadvantage because of the varying length of the labours.

Frequency of Undue Delay in Delivery.

A study of Table I indicates that 70.7% of all patients will be delivered within twenty-four hours of induction, and a further 14.3% will be delivered in the next twenty-four hours; that is to say, 85% of patients will be delivered within forty-eight hours, leaving only 15% of cases in which one may consider that there is undue delay. In more than half (8.5%) of these delivery takes place within seventy-two hours of induction, only 6.5% of cases being left in which the interval is greater than seventy-two hours.

In the forty-eight to seventy-two hours group have been included a few cases in which, either because of deterioration of the patient's condition or for other reasons, Cæsarean section was performed earlier than forty-eight hours after induction.

The increase in the use of the method in the last three years following the previous survey by the obstetrical staff in 1944 is also apparent.

Frequency of Failure of the Method.

In this series Cæsarean section was performed in 33 of the 1113 cases of artificial rupture of the membranes (Table II gives the details of these cases with the reason for choosing this method). This gives an overall failure rate of 2.96%. Almost half of the failures (Group I) were in cases in which the method failed to initiate labour or in which the patient's condition was deteriorating and labour had not commenced.

The second subgroup (Group II) consists of cases in which labour had been initiated satisfactorily, but the course of labour was not such as to lead to successful completion of delivery (failed trial of labour).

The third subgroup (Group III) consists of cases in which the indications for the Cæsarean section were rather varied.

Effect of Delay on Maternal Mortality and Morbidity.

Table III shows all the maternal deaths in the series. These numbered 14, that is, a mortality rate of 1.25%, and it is a very striking fact that of these there is only one in which the interval from induction to delivery was more than forty-eight hours. The cause of death in almost all cases was not attributable to the method of induction, with the exception of the last case on the list, in which a grave error of judgement was made, in that the patient was put in the lithotomy position to rupture the membranes; as a result, acute pulmonary oedema was precipitated, to which the patient succumbed in half an hour.

It would thus seem that there is no increase in maternal mortality as the result of delayed response.

When, however, one considers the morbidity (Table IV) there is a different story. The morbidity rate for the whole series is 9.25%, whereas that for the group in which delivery occurred more than forty-eight hours after induction was 17.36%, that is, almost double. A further dissection of the latter figures is interesting, as the morbidity rate for the forty-eight to seventy-two hour group was 22.33%, whereas that for the over seventy-two hour group was 10.9%, a figure comparable with that obtaining for the whole series. The possible explanation of this anomaly will be considered later.

Effect of Delay on Foetal Mortality.

Delayed response to artificial rupture of the membranes markedly increases the foetal mortality rate. For the whole series this was 19.95%, but that in the "delayed" group was 31.97% (Table V), and in this case there is no

TABLE II.
Cæsarean Section After Artificial Rupture of the Membranes (A.R.M.).
Group I. (15 Patients.)

Parity.	Indication.	Time After A.R.M. (Hours.)	Result.		Weight of Baby.
			Mother.	Baby. ¹	
1	Increasing toxæmia.	28	Sudden death 24 hours later. Post-mortem: Preeclampsia.	Died.	lb. oz 3 11
4	Increasing toxæmia.	122	Alive and well.	Macerated.	2 6
1	Failed A.R.M.	56	Alive and well.	L.F.	3 5
2	Failed A.R.M.	67	Alive and well.	L.M.	4 2
2	Failed A.R.M.	60	Alive and well.	L.M.	4 5
2	Failed A.R.M.	117	Alive and well.	L.F.	4 4
4	Failed A.R.M.	163	Alive and well.	L.M.	2 15
1	Failed A.R.M.	76	Alive and well.	L.M.	8 15
3	Failed A.R.M.	225	Alive and well.	L.M.	5 5
1	Increasing toxæmia.	24	Alive and well.	L.M.	7 8
4	Failed A.R.M.	96	Alive and well.	L.M.	9 3
7	Failed A.R.M.	136	Alive and well.	L.F.	6 7
4	Increasing toxæmia.	22	Alive and well.	L.F.	3 12
2	Mitral stenosis.	0.5	Died of pulmonary oedema. Post-mortem: Cæsarean section.	S.B.	6 0
1	Increasing toxæmia.	67	Alive and well.	L.M.	3 9

¹ L.M. = live male; L.F. = live female; S.B. = stillborn.

Group II. (12 Patients.)

Parity.	Indication.	Gesta-tion. (Weeks.)	Time After A.R.M. (Hours.)	Baby. ¹	
				Con-dition.	Weight.
1	Preeclampsia	39	52	L.F.	lb. oz 5 9
1	Postmaturity.	40+	10	S.B.	6 14
2	Disproportion.	40	16	L.M.	7 12
1	Preeclamptic toxæmia.	40	41	L.F.	7 7
1	Preeclamptic toxæmia and disproportion.	40	22	L.M.	9 10
1	Preeclamptic toxæmia and disproportion.	39	66	L.F.	8 0
1	Preeclampsia.	39	107	L.F.	6 11
1	Preeclamptic toxæmia.	40+	54	L.M. (Died)	9 4
1	Preeclamptic toxæmia.	39	19	L.M.	7 3
1	Preeclampsia.	40	27	L.M.	6 10
4	Preeclamptic toxæmia.	40	85	L.F.	8 4
2	Previous 9 lb. baby vaginally.	40+	115	L.F.	7 2

¹ L.M. = live male; L.F. = live female; S.B. = stillborn.

Group III. (6 Patients.)

Parity.	Indication.	Time After A.R.M. (Hours.)	Baby. ¹	
			Con-dition.	Weight.
10	Essential hypertension; thought to have ruptured uterus.	7	L.F. (Died)	lb. oz 4 8
2	Preeclamptic toxæmia. Breech; unsatisfactory labour. Previous stillborn breech.	24	L.F.	6 3
1	Preeclampsia. Pulmonary oedema. Unatisfactory labour.	48	L.F.	5 8
3	Preeclampsia and marginal placenta previa.	39	L.F.	8 7
1	Eclampsia. Continuing fits after A.R.M.	7	L.M.	7 5
1	Eclampsia. Prolapse of cord with A.R.M.	1.5	L.F.	5 8

¹ L.M. = live male; L.F. = live female; S.B. = stillborn.

TABLE III.
Maternal Mortality.

Year.	Parity of Patient.	Age of Patient.	Time of Delivery after Artificial Rupture of Membranes. (Hours).	Gestation Period. (Weeks).	Indication for Induction of Labour.	Cause of Death.
1939-40	8	40	8	32	Accidental hemorrhage.	Anuria. Pyelonephritis. Chronic nephritis. Eclampsia.
1943-44	1	24	34	38	Eclampsia.	Acute pulmonary edema.
1944-45	1	23	27	38	Preeclampsia.	Preeclampsia. Acute duodenal ulcer.
1945-46	1	33	28	34	Preeclampsia.	Subacute glomerular nephritis. Uremia.
1945-46	1	30	47	33	Preeclampsia.	Preeclampsia without convulsions.
1945-46	1	23	36	36	Preeclampsia.	Preeclampsia toxæmia. <i>Note</i> : Sudden death 24 hours after Cæsarean section.
1945-46	1	38	28	34	Preeclampsia.	<i>Status epilepticus</i> .
1946-47	2	28	34	34	Eclampsia.	Eclampsia.
1946-47	2	26	7.5	34	Eclampsia.	Eclampsia. Cerebral hemorrhage. Abscess right lung.
1946-47	1	19	20	34	Preeclampsia.	Subacute yellow atrophy of the liver.
1946-47	6	32	14	28	Hyperemesis. Ante-partum eclampsia.	Chronic nephritis. Hydromephrosis.
1946-47	2	25	5	37	Chronic nephritis. Hydro-nephrosis.	Preeclampsia. Cortical necrosis of kidneys. Bilateral pyelonephritis. Acute endometritis.
1946-47	1	23	74	37	Preeclampsia.	Acute pulmonary edema. <i>Note</i> : Twins. Unsuccessful post-mortem Cæsarean section.
1946-47	2	30	0.5	38	Mitral stenosis.	

significant difference between the mortality in the forty-eight to seventy-two hour group and that in the over seventy-two hour group.

Effect of the Method on the Character of the Labour.

Hill found that labour after artificial rupture of the membranes was, on the average, two-thirds or less than two-thirds as long as normal labour in *primigravidae* and about half or less than half as long as normal in *multiparae*; but is this the whole picture?

Reverting to Table II, a study of those patients who were regarded as having failed in their trial of labour reveals some interesting points. (a) The average weight of the babies in this group is seven pounds seven and three-quarter ounces, which is not greater than the average weight of a newborn baby in Australia. (b) Four of the

of toxæmia—preeclamptic, eclamptic, hypertensive or nephritic—the only other large groups being maturity and post-maturity (49 cases), ante-partum hemorrhage (34 cases) and hydramnios (27 cases).

Nothing outstanding can be deduced from any of the figures in answer to this question, but it is clear that because of the slowness of the method in some cases it is unsuitable in any case of toxæmia in which rapid deterioration is apparent; Cæsarean section had to be performed subsequently in a number of cases because of increasing toxæmia.

In the earlier cases of the series no note was made of the "ripeness" of the cervix, and even in the later cases rupture of the membranes was performed in many cases in the presence of an unripe cervix.

TABLE IV.
Morbidity After Artificial Rupture of the Membranes.

Interval between Induction and Delivery.	Total Patients.	Morbidity.	
		Total Cases.	Percentage.
Over 48 hours (and failures)	167	29	17.36
48-72 hours (and failures)	94	21	22.33
Over 72 hours (and failures)	73	8	10.9
Total series	1,118	103	9.25

twelve babies were under seven pounds in weight, the smallest weighing five pounds nine ounces. (c) The gestation period of none of these patients was less than thirty-nine weeks. (d) There were two patients in the third subgroup in whom the labour was classed as unsatisfactory, and in both cases the gestation period was over thirty-eight weeks.

Although the numbers are small and there are many other factors to be considered apart from the size of the infant in such cases as these, there is enough to raise a doubt as to the effect of artificial rupture of the membranes on the character of the labour in those cases in which the gestation period is very close to term or in cases of postmaturity.

Contraindications.

Consideration of Table VI indicates that in 942 cases (84.6%) the indication for induction was some form

TABLE V.
Fetal Mortality After Artificial Rupture of the Membranes.

Interval between Induction and Delivery.	Total Patients.	Fetal Deaths.	
		Total Deaths.	Percentage.
Over 48 hours (and failures)	167	51	30.54
48-72 hours (and failures)	94	30	31.97
Over 72 hours (and failures)	73	21	28.76
Total series	1,118	222	19.95

More attention is being paid to the condition of the cervix at present, but it would seem that even a very unripe cervix is not a real obstacle if the indication for rupture of the membranes is sufficiently urgent.

Induction of labour for maturity or postmaturity places us on much less certain ground than any of the other indications for the following reasons. (i) The criteria of maturity and postmaturity are so uncertain. (ii) In the vast majority of cases of so-called postmaturity the mothers come into labour spontaneously. (iii) In most of the cases of "failed trial of labour" in this series the fetus was either close to maturity or postmature. (iv) In conditions classified as "postmaturity" there is often a posterior position of the fetus, with accompanying uterine inertia during labour; and such conditions are much less formidable if the membranes remain intact. (v) The presence of an unfixed head in a *primigravida* is not a contra-

indication to artificial rupture of the membranes if the fetus is premature and small, but it is a brave man who will rupture the membranes of a *primigravida* with a post-mature fetus whose head is unfixed. It would thus seem that there is little place for artificial rupture of the membranes in postmaturity, as the highly problematical gain is outweighed by serious disadvantages.

The position of artificial rupture of the membranes in ante-partum hemorrhage is rather different from that in the other groups, as it is used primarily as a means of controlling the hemorrhage and does not come within the scope of this paper.

TABLE VI.
Indications for Artificial Rupture of the Membranes.

Indication (Toxemic Group).	Cases.	Indication (Other than Toxemia).	Cases.
Preeclampsia toxæmia ..	341	Maturity ..	6
Preeclampsia ..	111	Post-maturity ..	43
Mild toxæmia ..	161	Ante-partum hemorrhage ..	34
Eclampsia ..	74	Previous stillborn child ..	5
Essential hypertension ..	233	Previous disproportion ..	5
Previous toxæmia ..	15	Disproportion ..	4
Albuminuria (unclassified) ..	1	Hydramnios ..	27
Renal inefficiency ..	2	Pyelitis ..	16
Chronic nephritis ..	4	Other causes ..	31
Total ..	942	Total ..	171

Means of Minimizing the Risks of Delay.

Care in the selection of cases is the main prophylactic measure, and this has been dealt with in the preceding section.

The main danger to both mother and fetus in cases of delayed response is intraamniotic infection, and that this is a real danger is shown by the increased maternal morbidity rate in this group and the increased fetal mortality (Tables IV and V).

The infecting organisms were found in this series to be predominantly the anaerobic streptococcus and *Bacillus coli*. In some of the cases the anaerobic streptococcus is found alone, but the *Bacillus coli* or other unidentified Gram-negative bacillus was frequently found in conjunction with it.

For therapeutic measures to be of any value, early diagnosis of infection is imperative, and this can be done only by the repeated taking of vaginal smears and growth of cultures.

The method in use at this hospital is as follows.

Vaginal smears are taken and the material is incubated daily after the first twenty-four hours, or immediately if there is a rise in temperature.

Dr. Hildred Butler has found that anaerobic streptococci are grown in about 40% of all cases in which cultures are made from vaginal material, so that the mere finding of these organisms in culture is not sufficient evidence in the absence of symptoms that infection is present. Her diagnosis of infection is based largely on the evidence of tissue reaction as found in the stained preparation from the smear, and particularly changes in the amount of tissue reaction in successive smears. The tremendous advantage of this is that an opinion can be given as to the presence or absence of infection in about half an hour, and if infection is diagnosed the patient is immediately given a course of chemotherapy, which may be modified on the following day when the result of the incubation becomes known.

Suspect subjects are given penicillin in dosage of 15,000 units every three hours and sulphamerazine is given twice daily as follows: first day: twelve tablets in the morning and eight tablets in the evening; second and third days: six tablets twice daily; fourth day: four tablets twice daily; fifth day: three tablets twice daily.

Patients with febrile reactions or in whom investigation of the smear suggests established infection are given an

initial dose of 50,000 units of penicillin and 30,000 units every three hours thereafter.

If the growth of a culture confirms the presence of a mixed infection, both penicillin and sulphamerazine are continued. If anaerobic streptococci are found alone, the sulphamerazine is omitted, whereas if *Bacillus coli* is found alone the penicillin is stopped.

This method has been routinely used for the last four years and appears to be satisfactory, as there were no maternal deaths from sepsis in the entire series.

The routine use of this prophylactic chemotherapy would also explain the surprising drop in maternal morbidity in the over seventy-two hour group as shown in Table IV. It would seem that, if the outcome of labour is delayed beyond seventy-two hours, there is time for the chemotherapy to have its maximum effect, and the morbidity in this group is less than half that in the forty-eight to seventy-two hour group, being only slightly above the overall morbidity for the whole series.

A similar reduction in fetal mortality is, unfortunately, not found, there being no significant difference between the two groups. This is perhaps not surprising as prematurity accounted for 15 of the 51 deaths in the delayed group, and intrauterine asphyxia for another 15, while seven fetuses were macerated. Control of intra-amniotic infection would not be expected to reduce materially the fetal loss from these causes.

The Place of Medicinal Stimulation.

Medicinal stimulation was used in conjunction with artificial rupture of the membranes in almost all cases, usually by the Johns Hopkins method, in which the membranes are ruptured after administration of the castor oil and enema and the pituitrin is given later.

The number of medicinal stimulations per patient varied from one to seven.

I consider that vast quantities of pituitrin are wasted when the Johns Hopkins method is used, as a large percentage of patients will come into labour within twenty-four hours of rupture of the membranes without the use of medicinal stimulation. It is, to my mind, much more rational to withhold the medicinal stimulation until twenty-four hours after the surgical induction.

Repetition of the medicinal stimulation at intervals of forty-eight hours may be carried out in those cases in which there is no response, and this may prove effective, but frequent repetition is not without risk to the fetus.

Summary.

1. In 15% of cases vaginal delivery does not occur within forty-eight hours of artificial rupture of the membranes, and in 6.5% it is not completed in seventy-two hours.

2. In spite of this there is no statistical evidence that the method is other than safe, because in the series of 1113 cases there was only one maternal death which could be directly attributed to the procedure, and even this might have been avoided by a little forethought.

3. The maternal mortality is not increased by delayed response to induction.

4. Morbidity is increased by delay in the completion of delivery, but serious complications may be reduced by prophylactic chemotherapy.

5. Fetal and neonatal mortality are increased as a result of delayed response, and at present no means has been found by which these may be reduced.

6. Cesarean section was required to complete delivery in 2.96% of cases, there being one death from the combined procedure.

7. Medicinal stimulation is a useful adjunct to artificial rupture of the membranes, but it can be overdone.

Conclusion.

In conclusion it may be stated that care in the selection of cases will do much to reduce the incidence of Cesarean section following artificial rupture of the membranes, and vigilant supervision in cases in which response is delayed will make early diagnosis of infection more frequent, with consequent improvement in results.

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OVULATION IN THE SEXUAL CYCLE AND BASAL TEMPERATURE PATTERNS.¹

By J. W. JOHNSTONE, M.S., D.G.O., M.R.C.O.G., F.R.A.C.S., Honorary Obstetrician, Women's Hospital, Melbourne; Medical Officer-in-Charge, Sterility Clinic.

PART I: OVULATION IN RELATION TO THE SEXUAL CYCLE.**The Sexual Cycle.**

The mature or reproductive period of the female life-time, extending from puberty to the menopause, is made up of a number of recurring sexual cycles, 13 yearly, or in all perhaps some 400. The external and most objective manifestation of this cyclic process is the menstrual flux itself, and it is not surprising that the various characters of this presenting feature should have engaged the attention of clinical gynaecologists of the past to the exclusion of other events in the cycle. However, the menstrual flow is but the end stage of the cycle, and, moreover, of a cycle which has become effete and sterile because of failure of the ovum to advance through the stages of a gestation. Previous observers have pointed out that each menstrual flow represents the lochia of an infertile abortion, and the female thus continues to menstruate only because she does not conceive. Under natural biological circumstances she might be expected to undergo, not 400 sterile twenty-eight day cycles, but something less than 40 fertile 280 day cycles.

A better appreciation of the hormonal mediation of the menstrual rhythm and of the more deep-seated and associated cyclical events has shifted attention away from the flow itself and centred it upon the process of ovulation. To the clinical gynaecologist no less than to the biologist, this event of ovulation is the biological *fastigium* of the sexual cycle. It is little wonder, then, that much interest and endeavour in modern gynaecology are concerned with determining, not only the fact that ovulation is occurring, but also its time relationships, and the disposition of the other cyclical changes which precede and follow it.

Evidence from many aspects of study leads to the conclusion that ovulation occurs usually once in the cycle and at a time which bears a reasonably fixed relationship to the menstrual period which follows it. The general opinion is that ovulation occurs at approximately fourteen, plus or minus two, days before the period which follows.

Anovulation.

It is now accepted without dispute that ovulation is by no means always an incident in the cycle, although it must be regarded as a manifestation of its normal physiological completeness. In some higher primates anovulation is physiological and seasonal during the non-breeding times. There is said to be such a tendency to a breeding season in some of the lower races of mankind, and in some of the Eskimo tribes amenorrhoea is also said to be usual during the long winter months. In the human it is rather common, and probably physiological, at puberty, when the cycle is being established, and towards the menopause, when the

cycle is again unstable and diminishing through the various stages of incompleteness to the physiological amenorrhoea of post-maturity. The anovular cycle can thus be regarded as an incomplete one or as a partial digression towards amenorrhoea. The physiological basis is believed to be due to subthreshold levels of pituitary gonadotrophic hormone, or to an unbalanced or deficient prolactin B (luteinizing) component of the gland. Ovarian follicles advance towards maturity; but there are failure of rupture, failure of transformation of granulosa cells to *corpus luteum*, and a persistent secretion of oestrogen, without superimposed progesterone formation. The prolactin B, *corpus luteum*, progesterone side of the cycle would appear to be the last to be added and the first to disappear. Lack of team work by the secondary sex sterols reflects itself in an aberration of endometrial pattern, so that there is no post-ovular secretory endometrium in the second half of the cycle, but the preovular proliferative pattern is carried up to the ensuing menstrual period. It would appear further that even in ovular cycles there may be qualitative variations in the *corpus luteum* secretory side of the hormonal brew. Deficiency is manifested by a poor quality secretory endometrium with patchy and imperfect ripening to the normal secretory pattern, while the reverse is seen in those cases in which an "over-ripe" secretory structure borders on the decidua of pregnancy. There is some reason to believe that these variations in valency of the maternity "nest building" hormone, progesterone, may play a part in the ease with which the fertilized zygote gains its symbiotic attachment to the mother's endometrium.

Sterility due to nidatory failure, "touches of pregnancy" with menstrual irregularity, and some habitual abortion syndromes, may well be qualitative variations of the same deficiency. It is further known that anovular cycles may be mixed with ovular cycles. Habitual anovulation would account for complete sterility, and lowered fertility may result from variable or only sporadic ovulation.

Physiological Uterine Haemorrhage.

There are three types of haemorrhage from the uterus which are of a physiological rather than a pathological nature and are of some interest.

1. Menstrual hemorrhage. The end of the normal cycle is characterized by the exfoliation of the superficial layers of the prepared secretory endometrium in a state of coagulative necrosis with haemorrhage. This condition may be produced by acute lowering of hormonal levels, either of oestrogen alone, or of oestrogen in association with progesterone. Whatever other factors may be involved—and they are probably many and complex—the haemorrhage and necrosis would appear to be mediated through an effect on the blood vessels. There is prolonged spasm of the spiral arterioles in the deeper endometrium, with necrosis superficially and subsequent vasodilatation, stasis and bleeding. Although these vascular changes may be induced by acute deprivation of hormone from a supra-threshold level, they may be induced directly on the blood vessels by some parasympatheticomimetic drugs, particularly "Prostigmin", which has been used diagnostically to exclude pregnancy by precipitating haemorrhage. Moreover, these vascular changes, while they occur in the normal ovular cycle on a relatively fixed type of endometrial pattern, have no causal relationship to its structure. They may be superimposed upon a simple proliferative endometrium, as in anovular menstruation, or on a "Swiss cheese" endometrium, as in *metropathia haemorrhagica*, these two conditions being varieties of the same process. Furthermore, by the condensation of block doses of hormone into high dosage over a short time, haemorrhage may be mediated by vascular means from a resting or an atrophic senile type of endometrium. Physiological hemorrhage from the uterus is thus the result neither of antecedent ovulation, nor of the type of endometrium; but all three are important manifestations related in parallel with the deep-seated hormonal process underlying the sexual cycle.

2. Ovulation hemorrhage. Related to the time of ovulation or immediately preceding it in some animals, notably

¹ Read at a meeting of the Victorian Branch of the Royal College of Obstetricians and Gynaecologists on November 7 and 8, 1947.

the dog, endometrial congestion with external haemorrhage is the rule. This vascular oestral effect would appear to be a common manifestation of the cycle in animals, but in only a few is there external loss. Intermenstrual ovulation haemorrhage of variable degree is a sporadic event in some women, and on occasions would appear to be more or less habitual. It is not uncommon when a large number of patients are under visual examination, as in a sterility clinic, to see the cervical mucus blood-tinged when the cervix is exposed at this time in the cycle. This represents an occult manifestation of the condition, in which the lost blood is so slight in amount as to be disintegrated before appearing at the vulva. Routine washings of the vagina with saline solution have shown that this occult but microscopic loss is a common or even routine manifestation of the normal cycle.

3. Implantation haemorrhage. This occurs as a common physiological event about the site of nidation of the early ovum, but it is open to doubt whether it often produces an external loss of any magnitude. It is noted that it does not occur with immediate nidation on about the twenty-first day, but almost always follows about six days later, and this coincides with the time of the first missed menstrual period. The effect in upsetting the calculated date of labour is obvious. There is some justification on clinical grounds for regarding haemorrhage at the time of the first, and even the second, missed menstrual period as being physiological; but such haemorrhage, especially if irregular or of any extent, is best regarded as a threat of abortion.

Practical Value of Ovulation Time.

1. The determination that ovulation is occurring is a necessary part of the investigation of cases of sterility, as its habitual absence implies sterility. Absence of ovulation in women complaining of sterility has been variously estimated, but it may be present in approximately 5% of such cases. Of 591 women studied in the sterility clinic at the Women's Hospital, 4.7% were regarded as habitually anovular, and in a further 3.2% ovulation was regarded as deficient or sporadic.

2. If the time of ovulation in the cycle can be predicted, then it is possible to increase the chances of conception by concentrating on this interval. Particularly is this so when intercourse is infrequent or the parties are together only on occasions. By simple advice it may be possible to enhance the relative chances of conception many times.

3. Conversely, for those who wish to avoid pregnancy, abstinence over this time should greatly diminish or exclude the possibility of conception. This forms the basis of the Knaus and Ogino safe-period technique. This contention is based on the theory that ovulation occurs only once in the cycle and at a relatively constant interval of fourteen days preceding the flow. Further assumptions are that the ovum is not capable of being fertilized for more than twenty-four hours after extrusion, and that the spermatozoa do not survive longer than a maximum of forty-eight hours in the female genital passages. It is believed that in the human, coitus and other extraneous stimuli cannot induce ovulation as they do in some lower animals. On this assumption the optimum time for pregnancy to result in regular twenty-eight day cycles is when intercourse occurs between the twelfth and fifteenth days, and the further away from this interval, the less likely is conception. The obvious difficulty is that unless a reliable method can be found for determining the exact time of ovulation in each cycle, the theory must rely on blind deduction from the menstrual date of the preceding flow.

4. With regard to the calculation of the period of gestation, it is obvious that the fixed point from which pregnancy commences and from which the period of gestation should be more accurately determined is the ovulation time and not the preceding menstrual period. The only phase of the cycle which is relatively fixed is the post-ovular phase, and spontaneous variations in the length of the pre-ovulatory phase may lead to false overtime estimations. In cases of amenorrhoea, in which there is no antecedent menstrual period for reference, the time of ovulation would be of precise benefit in the calculation

of the expected date. The period of gestation is more accurately timed at thirty-seven weeks from nidation, thirty-eight weeks from ovulation, and usually forty weeks from the end of the previous cycle.

Methods Available for Determining Ovulation.

In the human, ovulation is an obscure process, and the delay in appreciating its value as an important gynaecological event is due to the somewhat complicated methods necessary to determine its occurrence. It may be of value therefore to enumerate some of the incidents and methods which throw light on its time-relationship to events in the cycle.

1. Examination of the ovary. Macroscopic and microscopic examination of the ovaries and *corpus luteum* is possible in the animal as a deliberately timed procedure, but in gynaecology its use can be limited only to the occasional inspection during laparotomy.

2. Recovery of tubal and early uterine ova. This has been accomplished experimentally in monkeys, and there is accumulating a series of such early ova in the human recovered from tubal washings and from early pregnancies accidentally found at endometrial biopsies. The precise time of ovulation must still be a matter of deduction from the age of the foetus.

3. External palpation of the ovaries. In some monkeys it is possible to palpate the ovary rectally against the sacrum and thus trace the development and rupture of the follicles. Occasionally it is possible to deflate a small cyst in the human ovary by bimanual examination, but the method is obviously uncertain.

4. Dysmenorrhoea. It is believed that typical spasmodic dysmenorrhoea occurs only in ovarian cycles, and that in those cases in which the condition does not occur until some years after puberty, the preceding adolescent cycles were anovular in type. It is noteworthy that in functional menorrhagia, which is usually anovular, pain, except clot colic, is absent even although the loss may be profuse.

5. Subjective oestrous phenomena. Oestrous behaviour as an accompaniment of ovulation is of great value in animal husbandry. In some animals, such as the rabbit and ferret, oestrus persists and the ovum is released only after copulation. In the human, perhaps with the higher development of the central nervous system, there appears to be no rhythm of oestrous action to define ovulation.

6. Ovulation pain. Periodic intermenstrual pain, "Mittelschmerz", is a not uncommon accompaniment of ovulation, and in some women it is a usual occurrence. Many theories have been suggested to account for the pain, and it certainly can occur without pathological changes in the pelvis. One variety may be associated with blood spill from the ruptured follicle, and may be severe enough to demand a laparotomy. Being a subjective sensation, it is of limited value as a time-indication of ovulation.

7. Ovulation haemorrhage. This is sometimes known as "kleine Regel" or small period. As was pointed out earlier, this is normal in the dog and occurs in some women. The presence of blood in occult form from vaginal washings is said to be a more constant accompaniment of ovulation and may prove of practical value.

8. Changes in cervical mucus. Besides being blood-tinged on occasions, it has been noticed at the time of ovulation that the cervical mucus becomes more abundant, clear and thin. Intelligent women attending sterility clinics often note the presence of this discharge at the vulva at these times, and it is sometimes helpful. Evidence is accumulating to show that the cervical mucus undergoes cyclical phases of varying hostility or receptivity to spermatozoa and acts somewhat as a biological filter to their ascent. At this time of ovulation it is more permeable to spermatozoa and sustains their life longer. This knowledge promises to be of major importance in the understanding of sterility factors. It forms the basis of the Huhner test in sterility investigations.

9. Changes in the vagina and vulva. The vaginal smear technique, with the detection of cornified squames, is well known from experimental work on rodents, and although not so clear cut, it can be applied to humans. Reddening and oedema of the special skin of certain

monkeys is also observed, and a somewhat similar pouting and swelling of the vulva is well known and useful in animal mating procedures.

10. Hormonic assays. The cyclical changes in the endometrium and lower genitalia being dependent on the waves of pituitary gonadotrophins and ovarian sterols, it is not surprising that attempts have been made to correlate the blood and urinary curves of these hormones with events in the cycle. The pituitary hormone reaches a high peak of excretion about the time of ovulation, and the oestrogen curve is subject to two waves, the first of which is thought to precede ovulation while the second coincides in a general way with the progesterone wave in the latter part of the cycle. Presumably the *corpus luteum* continues to secrete oestrogens while also elaborating progesterone. The substance pregnandiol is derived molecule for molecule from progesterone, and subject to variations of destruction and elimination, it is excreted in the urine in quantities which serve as an index of progesterone production. It can be assayed by colorimetric means, and although its detection serves no useful purpose as regards timing of

ovulation, it shows indirectly that ovulation has occurred. The test promises to be of value in the abortion syndromes with progesterone deficiency. The general relationships of these hormonal curves to the cycle are illustrated in Figure I.

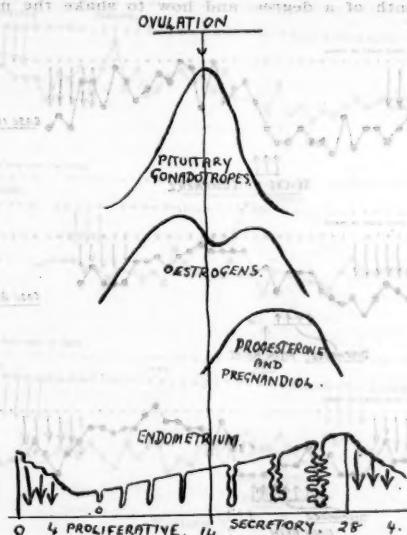


FIGURE I.

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11. Controlled intercourse. Pregnancy following a single coitus or under experimentally controlled conditions, as in caged animals, or during artificial insemination procedures, yields reliable data as to which days of the cycle are fertile, and serves as an indication of ovulation.

12. Other factors. Certain other factors which are of more purely academic interest may be mentioned, such as variations in vaginal acidity, glycogen content and iodine staining of the epithelial lining, activity of uterus to pituitary extract, certain spectroscopic blood changes, and variations in electrical potential.

13. Endometrial structure. The endometrium accurately reflects the stages of the ovarian follicle, and endometrial biopsy carried out as an office procedure by means of a special fine cannulated curette with a trap for the fragment is the standard method now used to establish ovulation. It is a routine procedure in sterility clinics and is useful in general gynaecology. As with the other methods, it provides only indirect evidence of ovulation and does not pin-point its occurrence. The technique of the procedure and the endometrial patterns during the phases of the cycle are well documented.

14. Temperature variations. It has been known for years that the daily temperature taken under basal conditions shows a pattern, and it is now established by many workers that this pattern serves as a reliable indication of ovulation and of the phases of the cycle. The procedure is a useful practical adjunct to the endometrial biopsy, particularly in cases of sterility, and may even serve to replace it to some extent. It is my purpose therefore to discuss in greater detail in the next section this useful new gynaecological aid, and to demonstrate its use in illustrating some of the physiological points already mentioned.

PART II: BASAL TEMPERATURE PATTERNS IN THE SEXUAL CYCLE

It is now a well-established fact that the normal sexual cycle associated with ovulation exhibits a biphasic pattern. References dealing with this particular aspect are listed at the conclusion.^{10,11,12,13,14,15,16,17,18}

The Ovular Pattern.

After menstruation the temperature remains at a relatively low level until about the time of ovulation;

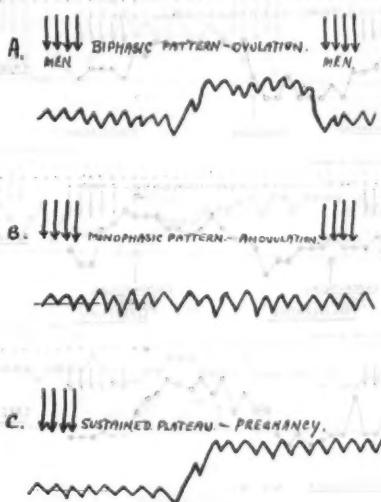


FIGURE II.

there is then a shift upwards in the general level to a higher plateau which is maintained until just prior to menstruation, when it subsides to the former level. This is diagrammatically represented in Figure IIIA. It has been suggested that under the influence of oestrogens the temperature tends to be depressed, and under the antagonistic influence of progesterone it tends to rise. Points which have been noted are that the temperature often tends progressively to fall slightly during the proliferative phase, often falling acutely just before the shift occurs to the secretory plateau. A slight depression has been described about the middle of the secretory plateau, and this has been correlated with the second oestrogen wave. I have found this in relatively few cases. The actual relationship of ovulation to the shift is not completely settled, but ovulation is presumed to follow soon after the acute drop and to be related to the peak of gonadotrophic production and the rising temperature. The premenstrual secretory plateau remains relatively fixed in duration with the temperature shift about fourteen days before menstruation, and variations in the length of the cycle are accounted for by variations in length of the pre-ovular or proliferative phase.

The Anovular Pattern.

When ovulation does not occur, the typical biphasic pattern is lacking, and the temperature is monophasic

and remains throughout at the preliminary low level as shown again in Figure IIb. Anovular cycles are usually a manifestation of some degree of endocrine deficiency, and the cycles are commonly but not always irregular. In the variety of anovulation of the *metropathia hemorrhagica* type the temperature is often rather irregular, and this may be correlated with the suprathreshold and fluctuating oestrogen levels. In amenorrhoea with an atrophic type of uterus the temperature is often low and monotonously uniform.

The Pregnancy Pattern.

If pregnancy should occur, it is noted that instead of falling just prior to the time of the expected menstrual period, the temperature remains elevated at the secretory plateau level, as shown in Figure IIc. It is noted also that it tends to become remarkably constant, usually about the 99° F. level, with little variation above or below. Persistence of the elevated level for much over fourteen days with a missed menstrual period is very highly suggestive.

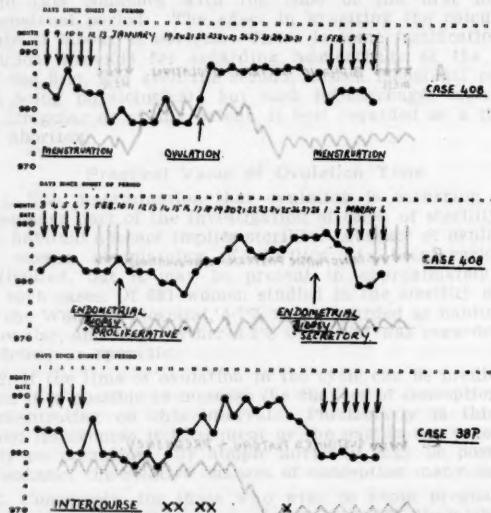


FIGURE III.
Case 408 (28/5 day cycle) and Case 387.

Not least interesting is the pattern of anovular cycles during pregnancy. So striking is the pattern that pregnancy can usually be diagnosed by a glance at the temperature chart and before the biological tests for pregnancy would be expected to give positive results—"the poor man's Friedman test". In a study of 50 pregnancy cases I have not seen one temperature chart which was not immediately diagnostic of pregnancy. The temperature chart is also useful and characteristic when pregnancy occurs during a period of amenorrhoea, and the temperature shift gives an accurate point of reference in estimating the expected date of confinement. It is further suggested that a high and well-maintained pregnancy plateau, in a general way, indicates good progesterone activity and strong nidation. These women do not easily have abortions, though they often feel unwell generally and are nauseated, with constipation, and vascular varicosities. They may be called "very pregnant women" in contradistinction to the woman who has "just a touch of pregnancy", in whom the fetal parasitic attachments are loose, abortion is more likely, and the progesterone plateau is low or subject to remissions. When patients are followed longer in their pregnancy, it is found that the pregnancy plateau subsides gradually to its former level at about the end of the first trimester, perhaps in a general way running a course parallel to the activity of the *corpus luteum*. This is an observation which I have made on a number of occasions when the temperature chart has been studied throughout

pregnancy. The time taken for the temperature to return to its former level varies, but there is usually a slow decline becoming steady about the middle of pregnancy.

Clinical Application.

It is almost a necessity to record the daily temperature on an appropriate chart in order to gain the necessary perspective in sequence, although it is possible with experience to interpret the listed roster of temperature recordings with the eye. Such charts as have been found convenient are shown in the illustrations and were printed to instructions by Arbuckle Waddell Pty. Ltd., of Melbourne.

The recorded range of 97° to 99.6° F. has been found to cover most cases, although it is not the actual temperatures which matter but the pattern. Each woman sets her own standard and may reproduce in successive cycles slight variations peculiar to herself; but the general level of shift is of the order of 0.8°.

The patient is given written instructions how to take the temperature and read the thermometer to one-fifth or to one-tenth of a degree, and how to shake the mercury

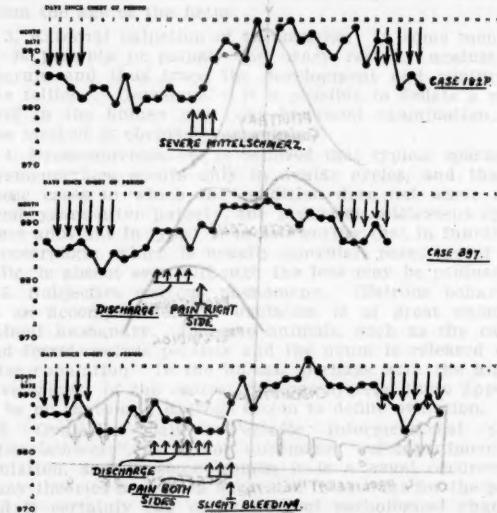


FIGURE IV.

down. This is time consuming, but it is well worth while instructing the patient minutely. In a short time many patients find it so easy that they continue on their own accord for extended periods. The more intelligent patients can be issued with the charts and directed to record the temperature from period to period, commencing the record with the first day of a menstrual period and taking the temperature during menstruation. The patient is instructed to take the temperature as soon as waking, and before getting out of bed or taking food or drink, by inserting the moistened thermometer bulb into the rectum for at least three-quarters of an inch, and leaving it there for at least two minutes. Minor colds and infections have a disturbing influence and should be noted on the chart, as well as any other features of interest such as pain, discharge or haemorrhage. Vaginal and mouth temperatures have been found to follow the rectal pattern, but mouth temperatures are not so reliable. I have found evening temperatures unreliable. Climate and external environment seem to have little influence on the pattern, although the smooth, even curve is more likely in the phlegmatic person of regular habits. Tompkins⁽¹⁰⁾ has shown that the consumption of alcohol, even in small amounts, seems to have a disturbing effect on body metabolism and is followed by a peak on the chart on the next morning. I have found this often, but it is not the invariable rule after taking alcohol.

In accordance with the method outlined, and by means of the material available in a large sterility clinic and in private practice, approximately 1100 cycles have been studied in a somewhat smaller number of patients. Consecutive cycles have been studied for over a year, and in some cases throughout and after pregnancy. In many cases endometrial biopsy was carried out as a complementary procedure, and indeed when menstruation is irregular the temperature shift is a useful guide in selecting the time for biopsy. From this series the biphasic temperature pattern was found to be directly correlated with the endometrial pattern found at biopsy, and I am of the opinion that it provides a reliable method of establishing ovulation. In dealing with private patients I have come to use it in preference to biopsy which is used as a complementary procedure much as the hysterosalpingogram is used as an adjunct to gas insufflation. It has the advantage over biopsy in that it requires less materials, expense, and expert knowledge, and gives a more kaleidoscopic perspective of events. Its disadvantage is that it

408 and another from Case 38P. The low proliferative phase with the temperature shift about the time of ovulation and the higher secretory phase are illustrated, and are correlated with biopsy findings deliberately performed in the second cycle. In the second cycle the temperature shift is not so critical as in the first, but is preceded by a more defined drop, and there is some depression of the secretory plateau. The third cycle illustrates the biphasic pattern, but the temperature shift is by a slow rise, which is more common than the abrupt rise.

In Figure IV the first strip shows a well-defined biphasic pattern in a patient who was subject to severe ovulation type of pelvic pain, or *Mittelschmerz*, which occurred in this cycle on the days shown. This patient was known to have some degree of pelvic inflammation, as she had not so long previously been operated upon, the Fallopian tubes being freed of filmy occluding adhesions and a retroversion corrected. Two cycles after this recording she became pregnant with an ectopic gestation, and operation was performed at the Women's Hospital. This periodic ovula-

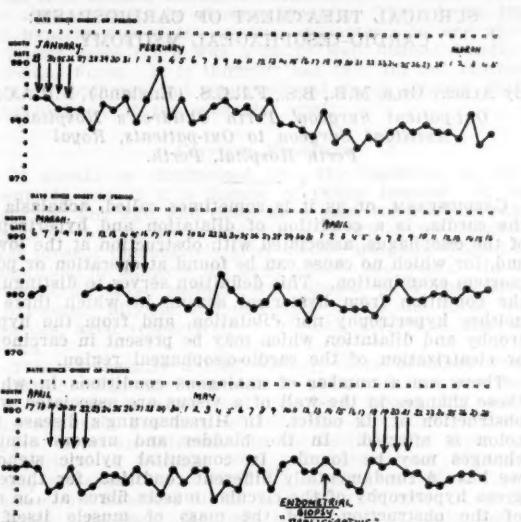


FIGURE V.
Case 325, irregular cycle.

is time-consuming and depends upon the cooperation and reliability of the patient. The interest and intelligent cooperation of patients are remarkable. Particularly is this so on the part of the sterile, in whom the feeling is engendered that their case is held constantly under attention instead of being confined to the staccato interview.

The exact relationship of ovulation to the temperature shift may still be a matter of conjecture, but it is believed by many that the most fertile time is immediately after the rise. I am inclined to doubt this, and I have cases of pregnancy in which the only exposure was undoubtedly several days prior to the shift. The greatest difficulty found is that in the majority a gradual rise occurs over a few days rather than a critical shift, although the biphasic pattern may be well defined. This somewhat limits the usefulness of the method in selecting the times for exposure, as it is often difficult to foresee events which are immediately apparent in the chart when viewed in retrospect. On many occasions cycles are seen in which irregularities occur which cannot be interpreted. It should be realized that the thermometer is a sensitive instrument being used in these cases over a small range, and we should beware of drawing unwarranted conclusions from minor variations and bizarre patterns.

Clinical Illustrations with Comments.

Figure III shows the type of charts used and illustrates the method of recording two consecutive cycles from Case

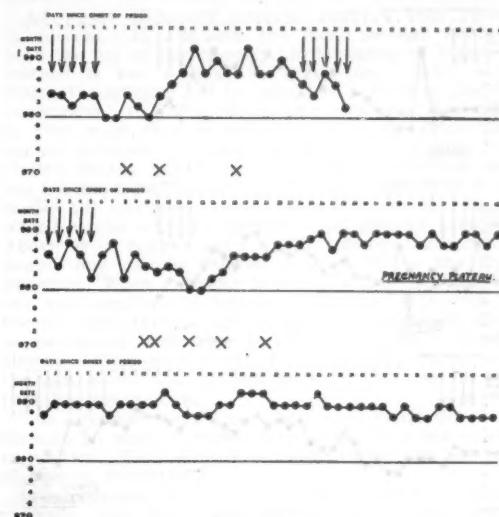


FIGURE VI.
Case 60P, 26-35/5 day cycle.

tion pain is quite common, however, when there is no pelvic inflammation. The next two strips on the same sheet are successive recordings from another patient who was subject to this pain either unilaterally or bilaterally, to intermenstrual mucoid discharge, and to hemorrhage of the ovarian or *kleine Regel* type. These features had the habit of occurring in various combinations, and their time relationships in these two cycles are as illustrated.

In Figure V the record of a woman with menstrual irregularity and anovulation is shown; the temperature chart is run in continuity over eighteen weeks and includes four hemorrhages. The interval between the last two is twenty-nine days, and the reading is a good illustration of the monophasic anovular pattern. This habitual anovulation was shown, not only by several biopsies, but by temperature recordings for over a year. Such a state of affairs would account for complete infertility.

Figure VI illustrates a typical and well-sustained pregnancy plateau. It is noteworthy that when pregnancy occurs the temperature becomes stable after about 99° F. The times of intercourse are indicated by the crosses. Which was the exposure resulting in pregnancy would be purely a guess, but I should say the third one on the fourteenth day. I have seen a number of pregnancies from what was almost certainly only a single exposure some days before the temperature shift, but I have not seen one in which I was satisfied that the exposure was

after the shift. Persistence of the sustained, even plateau for seventeen or eighteen days after the shift in the absence of menstruation is diagnostic of pregnancy, even before the biological pregnancy tests are reliable. This has been called the "poor man's Friedman test". I have not yet seen a case of pregnancy in which the condition was not obvious at once from the temperature pattern, nor have I seen the typical pattern in the absence of pregnancy.

In Figure VII the first two curves illustrate the effect of alcohol in producing a steeple-like rise on the chart the next morning. I have been able to confirm this observation of Pemberton Tompkins on many occasions, even after the ingestion of small quantities of alcohol, but it is by no means invariable. The purpose of the sheet is to illustrate what is almost certainly an early abortion in the third recording. The delay of eight days in the onset of the period is taken up, not by the proliferative, but by the secretory phase, and the delayed period was prolonged and heavy, with the discharge of

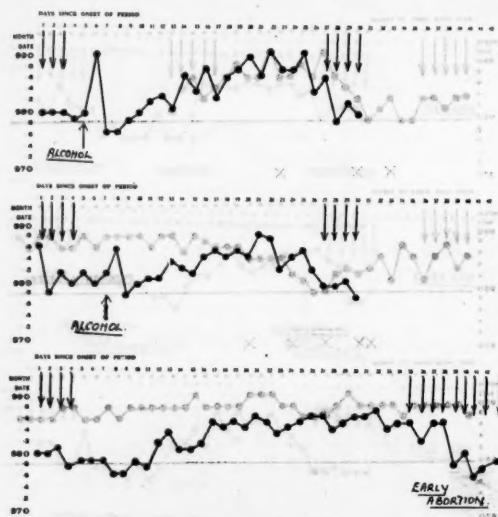


FIGURE VII.
Case 130P, 27/4 day cycle.

clots and shreds of tissue. Such a condition is almost certainly a "touch of pregnancy", but could possibly be due to persistent *corpus luteum* cyst, analogous to the pseudopregnancy of lower animals. The condition occurred soon after insufflation of the patient's Fallopian tubes, and she became pregnant again in two months.

SUMMARY.

1. The events of the sexual cycle are discussed with emphasis on the importance of the incident of ovulation.
2. The methods of determining the occurrence of ovulation and its time relationships are presented, and the practical value of this knowledge is discussed.
3. The importance of recording the basal temperature as a useful and reliable method is suggested in studying ovulation and the features of the cycle.
4. Charts are shown to illustrate the various types of temperature patterns, and comments which may be of interest are made on their interpretation and correlation with events in the cycle.

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SURGICAL TREATMENT OF CARDIOSPASM: CARDIO-ESOPHAGEAL MYOTOMY.

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CARDIOSPASM, or as it is sometimes called, achalasia of the cardia, is a condition of dilatation and hypertrophy of the oesophagus, associated with obstruction at the lower end, for which no cause can be found at operation or post-mortem examination. This definition serves to distinguish the condition from hysterical spasm, in which there is neither hypertrophy nor dilatation, and from the hypertrophy and dilatation which may be present in carcinoma or cicatrization of the cardio-oesophageal region.

There are a number of analogous conditions in which these changes in the wall of a viscous are associated with obstruction at its outlet. In Hirschsprung's disease the colon is affected. In the bladder and ureters similar changes may be found. In congenital pyloric stenosis we have a fundamentally different condition, for there is gross hypertrophy of the circular muscle fibres at the site of the obstruction, and the mass of muscle itself is sufficient to form an anatomical obstruction. It is of interest and not generally known that dilatation and hypertrophy of the oesophagus may be present in association with congenital pyloric stenosis (Pritchard and Hillier, 1920; Walton, 1925).

A number of theories have been advanced to explain the condition, none of which is entirely satisfactory. The oldest theory is that it is due to active spasm at the cardiac sphincter. This explanation has been criticized on the grounds that if spasm was present, there should be muscular hypertrophy, as in congenital pyloric stenosis. However, this is not a valid argument against the theory of spasm, for there is nothing to show that the hypertrophied muscle in pyloric stenosis is a response to spasm rather than a congenital deformity. Strongly in favour of the spasm theory is the intermittent nature of the symptoms in the early stages. The severe and intermittent pain is what might be expected in the presence of spasm.

The theory of neuro-muscular incoordination has gained wide acceptance. This supposes a failure of active relaxation of the cardiac sphincter in coordination with the oncoming peristaltic wave. No explanation is offered as to why this failure of relaxation occurs.

PATHOLOGY.

The dilatation commences just below the level of the cricoid cartilage and increases to about half-way down the oesophagus, from where it extends to the lower end. It is always associated with some degree of lengthening of the oesophagus, and this fact is made of practical use at operation, in the manner to be described. The tortuosity of the oesophagus, which is the result of this lengthening,

must also be borne in mind in the passage of bougies or dilators.

There have been differences of opinion as to the exact level of termination of the dilatation at the cardiac end. The older writers described the dilatation as terminating at the orifice. Hill was of the opinion that the obstruction was not at the cardiac orifice, but at the level of the diaphragm. Moore examined fourteen specimens and found that the dilatation reached right down to the cardiac orifice in three, while in eleven it ended at the level of the diaphragm.

In the six cases in which the writer has observed the condition at operation, a portion of undilated oesophagus was clearly present below the level of the diaphragm.

As constantly present as the dilatation is the hypertrophy of the oesophageal muscle, and the greater the dilatation, the greater the hypertrophy. The circular fibres are those chiefly involved. Below the level of the diaphragm, where the dilatation ceases, the muscular coat is of normal thickness; in fact, it sometimes appears in this region to be abnormally thin. There is no trace of hypertrophy of the cardiac sphincter. In one of the writer's cases there was a fairly well defined bundle of circular fibres. It is thought that this did not represent a true sphincter, but was produced as an artefact during the division of the muscular coat.

CLINICAL FEATURES.

It should be emphasized that the condition is not a neurosis, nor is it a disease of young females. It may occur at any age, and cases have been reported in young infants. Langmead recorded one in which the condition was present immediately after birth. Morgan reported the condition in subjects all aged under two years. In my own series three patients were males, aged respectively forty-seven, fifty-six and fifty-eight years, and three were females, aged respectively, thirty-one, sixty and sixty-one years.

There is usually a long history, often of many years' duration. The chief symptom is pain, and this may come on immediately after food has been taken; but where the condition has been of long standing, the pain may appear after an interval. In the early stages there may be periods of freedom from pain, sometimes of a few days, sometimes of weeks. Thus, the resemblance to a gastric or duodenal ulcer may be very close. As the disease progresses, the pain loses its periodicity and is present whenever food is taken.

The patient indicates the site of the pain by pointing to the lowest portion of the body of the sternum or the xiphisternum. But when the pain is severe it involves a wider area, to include the whole epigastrium, and may pass through to the back.

It is characteristic of cardiospasm that more difficulty may be felt in the swallowing of fluids than of solids, and patients may volunteer the fact that fluids seem to stick, but that solids will go down. This is in contrast to carcinomas and stenosis due to cicatrization, in which fluids always pass more easily than solids.

Regurgitation soon follows the onset of pain, but occasionally pain alone is present for a long time before regurgitation appears. The regurgitation, like the pain, may at first be intermittent, but finally follows every meal. The regurgitated material is mixed with a frothy mucus and saliva and has not the characteristic odour of food that is mixed with gastric juice. Excessive salivation is a common symptom; saliva may be so profuse as to form a considerable proportion of the fluid regurgitated.

Wasting and emaciation are always pronounced when the symptoms have been present for any length of time, and thirst and hunger may cause the patient great suffering.

DIAGNOSIS.

The main problem is usually to distinguish the condition from carcinoma, and diagnosis is chiefly based on the radiological findings. Radiologically, the oesophagus is seen to be enormously dilated, the dilatation stopping at the level of the diaphragm and tapering off into the short,

undilated, subdiaphragmatic portion of the oesophagus. In carcinoma of the oesophagus at this level, the dilatation is not generally as great as in cardiospasm, and frequently some irregularity of the margin of the barium shadow is seen. But the distinction may be difficult. I have encountered a case of carcinoma at the cardiac orifice in which the X-ray findings were typical of cardiospasm.

When there is any doubt, the oesophagoscopy evidence is confirmatory. In cardiospasm, the enormously dilated oesophagus is seen as soon as the endoscope passes the cricoid cartilage. A pool of dirty fluid splashes about as the walls of the dilated oesophagus open and close with the movements of respiration, and at the lower end the tightly closed orifice is seen surrounded with characteristic vertical folds of the mucosa.

TREATMENT.

Medical treatment by such anti-spasmodic drugs as belladonna and amin nitrite is uniformly useless, and treatment resolves itself into a choice of two methods, dilatation with bougies and operative procedures.

Advocates of bougie methods claim a high percentage of success. In England, the most popular method has been the use of the mercury-filled bougies of Hurst. This method is not without its difficulties. Cases occur in which the bougies fail to pass, and coil up in the dilated oesophagus. In others the bougie may pass, but still fails to give more than transient relief. Yet other patients cannot tolerate the swallowing of the bougie. In the United States, dilatation by means of inflatable bougies has become a popular method. The instrument of Plummer is the one commonly used. This consists of a bougie to which can be screwed tapered metal ends of varying size. Above is a rubber cuff, which communicates with the bougie and can be inflated with water to the required pressure. When difficulty is found in inserting this bougie, one may employ the technique of passing it over a silk thread. The thread, with a small metal weight attached, is swallowed, and time is allowed for it to reach the stomach. The metal head of the bougie is threaded with the silk, which then guides the instrument in its passage past the obstruction.

The inflatable bougie may be passed under direct vision through an oesophagoscope, and in this way placed exactly in position. This appears to be the safest and best method of peroral dilatation.

It is conceded, even by those enthusiastic for dilatation methods, that there will still be some cases in which either the passage of the bougie will not be tolerated, or the method will fail to give relief. Operation is thus indicated when conservative methods have been tried and failed. Nor must it be forgotten that dilatation methods are not without hazards, because of the lengthening and the "J" shape of the oesophagus, and because of the danger of splitting the mucosa when inflation is used. Therefore, if an operative procedure is sufficiently certain in its results and low enough in its mortality, a case may be made out for using it as an alternative to medical treatment or as a preferential choice. It is considered that cardio-oesophageal myotomy fulfills these requirements.

Surgical Procedures.

The earliest suggestion for surgical treatment was made by Mikulicz, and his method of transgastric digital dilatation is still used. Walton advocated it, and recorded a series of seventeen successful cases. He reserved it for cases "where dilation from above is impossible or requires repeating at such short intervals that it is extremely irksome". In Mikulicz's operation as performed by Walton, the anterior gastric wall is opened with a longitudinal incision and the hand is inserted into the stomach up to the oesophageal opening. The index finger is then inserted with gentle pressure through the oesophageal opening, and is followed by the middle finger and finally the ring and little fingers.

Ochsner and DeBakey consider oesophago-gastrostomy the operation of choice. This is technically more difficult than either the Mikulicz procedure or extramucous myotomy (about to be described). It would appear to be highly successful as judged by the absence of recurrence

of the obstructive symptoms; but regurgitation of gastric juice, especially when the patient is in the recumbent position, is a functional disadvantage which mars the end results.

Extramucous cardio-oesophageal myotomy was introduced by Heller, who collected sixteen cases of the operation without fatality. Zaaijer described eight further successful cases. Barlow simplified Heller's operation by not turning up the costal margin and by not opening the stomach. He reported four successful cases in an article which stimulated interest in the procedure in England. Maingot collected fourteen more, ten from other surgeons and four of his own; three of these I had investigated, and I assisted Maingot at operation. A further three cases now reported make six which have passed through the writer's hands. All these series were without mortality. Recently Pieri, of Rome, quoted twenty-one cases without mortality and with complete relief of symptoms. This is a total of sixty-six successful cases without mortality.

Technique of Operation.

It is desirable to admit the patient to hospital at least a week before the operation, and during this time an attempt is made to reduce the oesophagitis by keeping the oesophagus empty and by lavage with a weak solution of sodium bicarbonate.

By careful selection of foodstuffs, the fact being kept in mind that solids are more easily taken than liquids, it is often possible to arrange a good calorific intake for the patient. As an example, it was found that one patient (Case III) was able to swallow, with little hold-up, raw eggs and small lumps of cheese, and that water with added glucose could be taken in frequent sips of less than half an ounce. Milk and tea were rapidly regurgitated. In addition, the usual vitamin preparations are given. In none of the six cases was there any severe degree of anaemia, and no pre-operative transfusions were used.

No solids are taken twelve hours before operation, and four hours before operation a Ryle's tube is passed.

A long left subcostal incision, extending from the mid-line to the tip of the tenth rib, gives excellent exposure. The next manoeuvre, after the peritoneum is opened, is of great importance in the exposure of the cardio-oesophageal junction, and simplifies the rest of the operation. A hand is placed on the upper surface of the left lobe of the liver, drawing it down and putting on tension the left triangular ligament. Two pairs of long-bladed Parker-Kerr forceps are placed on the ligament, which is then cut with scissors between the forceps from the free edge of the ligament to the mid-line. The left lobe of the liver, with the cut edge of its suspensory ligament still held in the forceps, is now conveniently turned downwards and medially, covered with a moist pack, and retracted. Vessels, whose open mouths are seen in the upper cut edge of the ligament, may now be ligated, and the upper forceps removed. With the left lobe of the liver held over to the right and gentle traction on the stomach, the junction of oesophagus and stomach is very well exposed.

The peritoneum, where it is reflected from diaphragm to oesophagus, is now incised transversely and the oesophagus freed all round by blunt dissection. Two or three small branches of the phrenic vessels require ligation. The left vagus nerve is identified where it lies on the oesophagus, and is easily freed and thrust over to the right. The oesophagus is now free, and lies loosely in the diaphragmatic opening. With the finger it is freed upwards, and because of its increased length, several centimetres of its lower end are easily drawn down into the abdomen. At this stage it is convenient to pass around the oesophagus a loop of tape, by which the oesophagus and stomach wall are held steady and ready for incision.

The incision of the muscle coat is about eight centimetres long, and extends from the dilated portion of the oesophagus above, across the short undilated portion, and on to the anterior gastric wall below. With a small-bladed knife the longitudinal muscle fibres are separated, and then the thin circular layer is divided. Division of these circular fibres may be tedious, because of the care necessary to avoid nicking the mucosa. The fibres tend to

be adherent to the mucosa. Sometimes well marked circular bundles may be underrun with a grooved director and then divided. The incision is carried down through the thicker muscular layer of the stomach wall, so that when it is complete, about four centimetres of the oesophageal muscles and four centimetres of stomach muscle have been divided, with the mucosa bulging through. A number of fine submucosal vessels will require ligation.

It is easy to nick the oesophageal mucosa, especially in one's effort to divide the last few remaining fibres stretched across the bulging mucosa. Such a puncture, if it occurs, may be closed with a fine atraumatic stitch. A small puncture of the mucosa may be easily overlooked, and therefore should always be sought before the abdomen is closed by squeezing of the stomach so as to force some of the gastric juice up into the oesophagus. A leakage of frothy fluid will betray the presence of a puncture.

Pieri advocates in all cases covering the area of bulging mucosa with a patch of free omentum as a means of lessening scarring at the site of the divided muscle—scarring which might lead to a recurrence of symptoms. This would appear to be an unnecessary precaution, which may, in fact, lead to the very consequence it is designed to avoid.

The liver is now allowed to spring back into position. With removal of the forceps from the hepatic edge of the cut triangular ligament, there is no haemorrhage, nor is it necessary to suture the divided ligament.

After operation the Ryle's tube is left in place, and for the first twenty-four hours only boiled water and glucose are taken by mouth. From then on increasing amounts of fluids and solids are permitted, so that at the end of a week a normal diet is resumed.

REPORTS OF CASES.

CASE I.—E.T.M., a male patient, aged fifty-eight years, had symptoms extending over six years. They had commenced with only slight sensations of food sticking in the chest, but after some months actual pain and later regurgitation followed every meal. There were periods in which symptoms were less severe, but for nearly three years he had not been free from them. He had been treated without relief with drugs and also by a psychiatrist. Attempts were made to give relief with mercury-filled bougies, but the patient found he was unable to swallow these, though on the few occasions when they did apparently enter the stomach relief followed. On several occasions during the four months prior to his first being examined, the regurgitated material had been streaked with blood. This patient was greatly troubled with excessive saliva, which he collected throughout the day in paper handkerchiefs.

On examination, he was found to be very emaciated, with a scaphoid abdomen. Radiographic examination of the oesophagus with a barium bolus showed the characteristic enormous dilatation. The lower end was bulbous and there was great delay in the passage of barium into the stomach. Once started, however, the barium passed through rapidly.

Pre-operative preparation in this case was carried out for ten days, a Ryle's tube being passed and left *in situ*. Four pints of milk a day were passed down the tube, in addition to glucose and vitamins.

Anesthesia was by "Pentothal" induction and by nitrous oxide and ether given by the endotracheal route. The technique of operation was as already described. Silk ligatures and sutures were used throughout. In this case there was a small but well-marked bundle of circular muscle fibres resembling a sphincter at the cardio-oesophageal opening, and these were underrun with a grooved director and divided.

After operation this patient received by transfusion one bottle of reconstituted dried plasma (500 millilitres) and one bottle of blood. Water and glucose were given for twenty-four hours, as much as the patient desired. The stomach was aspirated hourly through the Ryle's tube, which was removed in forty-eight hours. By the seventh day the patient was taking ward diet.

At no time after operation were there any symptoms of dysphagia or regurgitation. One month after operation, examination with a barium bolus showed no material change in the state of dilatation of the oesophagus, compared with the pre-operative picture.

CASE II.—R., a male Indian, aged forty-seven years, had symptoms of two years' duration. These had begun sud-

denly, with a sensation of fullness in the chest and later pain soon after meal. This pain had first been treated as of cardiac origin. Regurgitation had occurred during the last seven or eight months, at first only when the patient took considerable quantities of fluid, but later after both fluids and solids. Solids were always less troublesome than fluids. By frequently eating small amounts of solids he was able to satisfy his hunger. He took drinks in small sips at times other than when he ate. This patient was never treated with bougies or dilators, which were, in fact, not available.

The man was thin, but not emaciated. Radiographic examination revealed a greatly dilated oesophagus, with a smooth-edged bulbous termination. Under the fluoroscopic screen, after five minutes, a small amount of barium slowly trickled through. Finally the constriction opened, permitting the rapid passage of most of the barium. The patient said that he could feel the opening of the obstruction and passage of the barium.

An oesophagoscopic examination was performed under local anaesthesia, and the typical dilatation of the oesophagus, its wall moving with respiration, the pool of fluid and the closed orifice at the lower end, confirmed the radiographic findings. The oesophageal lining otherwise appeared normal, without congestion or ulceration. This patient was given only three days' pre-operative preparation.

Anaesthesia was by nitrous oxide and ether administered on a Boyle's machine. The operative technique was as already described. In this case, haemorrhage from the submucous vessels after division of the muscle was unusually troublesome. Penicillin and sulphathiazole powder were dusted on the bulging mucosa and on the operation wound before closure of the skin.

After operation a Ryle's tube was left in place, and intermittent aspiration was carried out. For forty-eight hours glucose and saline solution were administered intravenously. Fluids were given by mouth in restricted quantities for two days, and on the third day solids were permitted. This patient was nervous about drinking and eating, and returned to a full diet only by the twelfth day.

At no time after operation were any symptoms of hold-up in the oesophagus felt, and this was still so eighteen months later. No follow-up barium bolus examination was performed in this case.

CASE III.—T.F., a female patient, aged sixty years, had had difficulty in swallowing for fifteen years. There was a sensation of food stopping in the lower part of the chest. She was accustomed to wait, and after a varying interval it passed through. For the last two years she had had pain and regurgitation of food and mucus. Fluids gave her more trouble than solids. All the symptoms had become worse in the last three or four months, and for some weeks only morsels of food and drink had passed. She had lost twenty-eight pounds in weight in eighteen months, and felt weak and famished.

On examination, this patient was extremely emaciated, having the general appearance of a famine victim. Her skin was lax and leathery, and her abdomen scaphoid. A barium bolus and X-ray examination showed the typical appearance of cardiospasm.

The patient received ten days' pre-operative preparation. She was able to get past the obstruction raw eggs, fragments of cheese, and sips of water and sweet tea. These she consumed in quantity during the days of pre-operative preparation. Vitamins were administered parenterally. Venoclysis with glucose and saline solution was commenced on the day of operation and continued for twenty-four hours afterwards.

Anaesthesia was with "Pentothal", cyclopropane and curare. Exposure was through the usual left subcostal incision. There was again a little difficulty with haemorrhage from extramucous vessels during division of the muscle coat. The mucous membrane was accidentally nicked and in addition slightly torn at the site of the original nick, when a vessel that lay like a band across the otherwise completely bulging mucosa was being divided and picked up with a haemostat. The rent was closed with a fineatraumatic catgut intestinal suture. A small free graft of omentum was laid over it and penicillin and sulphamamide powder was dusted on the site.

A transfusion of 540 millilitres of blood was given at the termination of operation. The patient returned to a normal diet in five days, and at no time since operation have there been any symptoms. This patient has been followed for ten months, without any signs of recurrence, and has gained over two stone in weight.

It is of interest that while the patient may remain completely free from symptoms after operation, there may

be little change in the condition of the oesophagus as judged by the X-ray appearance. It still remains dilated, though there is no longer a hold-up at the lower end.

SUMMARY.

The surgical treatment of cardiospasm by cardio-oesophageal myotomy is described in detail. A further three successful cases are reported.

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Reports of Cases.

AN UNUSUAL ABDOMINAL MASS.

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Clinical Record.

J.S., a boy, aged seven years, was admitted to hospital at 5 a.m. on January 6, 1948, with a history of severe pain in the right iliac fossa since the previous evening. He had been "off colour" for two days with vague abdominal pains, anorexia and vomiting. About an hour prior to his admission to hospital he passed heavily blood-stained urine. Micturition had been frequent for the past twenty-four hours. His bowels had acted normally the day before his admission to hospital. He had had several previous attacks of lower abdominal pain, accompanied by anorexia and "slight feverishness". Upon his admission to hospital his temperature was 97.4° F. and his pulse rate 96 per minute, and examination of the abdomen revealed considerable tenderness in the right iliac fossa. There was no true rigidity, and no mass was felt. The urine was heavily blood-stained.

When examined at 11 a.m., the child looked very ill; his temperature was 98.4° F., his pulse rate was 104 per minute and his respirations numbered 24 per minute. His eyes were sunken and he appeared dehydrated. The tongue was dry and heavily coated and the breath "abdominal". The throat appeared healthy and the heart and lungs were

clinically clear. The abdomen was a little protuberant and respiratory movement of the lower portion restricted. Muscle guarding was present in the right lower quadrant, and a firm tender mass about the size of a hen's egg could be felt rising above the outer portion of Poupart's ligament on the right side. One had the impression that it was immediately beneath the anterior abdominal wall and not absolutely fixed. The mass was dull to percussion, and some suprapubic dulness was elicited. The abdomen elsewhere was lax, and no other mass or viscus could be felt. The hernial orifices were clear and there was no lump in Scarpa's triangle. *Per rectum* a fluctuant tender swelling could be felt on the right side; it was about the size of a hen's egg.

Examination of the back revealed an operation scar in the mid-line of the lumbar region, and the spines of the lower lumbar vertebrae were absent. Congenital deformity of the left foot was noted, evidently a *talipes equino-varus*, which had been corrected by operation at the Children's Hospital, Melbourne. Fairly widespread anaesthesia of the foot was present.

A plain X-ray film of the abdomen was taken. The renal outlines were not defined, but there were no opacities in the renal areas. The lower portion of the spinal theca was outlined by lipiodol and *spina bifida* affecting the lumbar vertebrae was noted.

The diagnosis was in doubt, and although the urine was heavily blood-stained and the temperature was normal, it was felt that an appendiceal abscess could not be ruled out. The leucocyte count was 28,350 per cubic millimetre.

The administration of 5% glucose solution in normal saline solution by the intravenous drip method was commenced while the operating theatre was being prepared.

Under ether anaesthesia the abdomen was again palpated, only to find that the mass had disappeared. Rectal examination revealed that the pelvic mass had also disappeared, and bimanual palpation could be performed without obstruction.

Cystoscopic examination had been arranged for, and as a preliminary a number 6 rubber catheter was passed without obstruction and blood-stained urine was drawn off. Attempts to pass sounds were unsuccessful despite meatotomy. There appeared to be a narrowing of the penile portion of the urethra just proximal to the meatus. Cystoscopy had to be abandoned, because only an adult cystoscope was available.

At this stage it had been decided that nothing further should be done; but final palpation of the abdomen revealed the presence of a sausage-shaped tumour in the right iliac fossa, rather more medial and deeply situated than the original lump. It could be felt to contract and harden beneath the fingers, in the manner of an intussusception. Without further ado the abdomen was opened through a McBurney incision. The caecum and appendix were normal, but occupying the right iliac fossa behind the peritoneum was an elongated sausage-shaped structure; it was soft and could be traced up to the kidney and down to the bladder, which was distended. The structure was presumably a hydronephrosis. The appendix was removed and the abdomen was closed in layers.

After operation the child had some difficulty in passing urine, and catheterization was necessary on several occasions. Otherwise the post-operative course was smooth, and on the fifth day excretion pyelography was performed. The radiologist reported the presence of gross bilateral hydronephrosis involving both calyces and pelvis. In addition there was extreme widening of the ureters to a diameter of about three-quarters of an inch, with elongation and tortuosity. Each ureter occupied a large area in the corresponding iliac fossa. The upper limits of the bladder were not clearly defined, but the bladder also appeared to be dilated to about the level of the fifth lumbar vertebra.

Comment.

The case is considered to be of interest, because it shows that a dilated ureter may be felt as an abdominal mass and also on rectal examination and may lead to confusion in diagnosis.

Reviews.

A YEAR BOOK OF ENDOCRINOLOGY, METABOLISM AND NUTRITION.

"THE 1947 YEAR BOOK OF ENDOCRINOLOGY, METABOLISM AND NUTRITION" is the second volume in the Year Book series to appear under this title.¹ It follows the same general plan as its predecessor and has the same editors. Willard O. Thompson, in his editorial introduction to the section on endocrinology, refers to the exclusion of many excellent articles because of limitations of space, articles selected being those dealing with the most important advances and those with a direct bearing on clinical medicine. The chapter on the pancreas and the miscellaneous chapter have been eliminated; the chapters on the adrenals, testes and ovaries are the longest because of the many excellent contributions in these fields; the chapters on the pituitary and the thyroid are relatively short, but contain important material. Editorial contribution is liberal and contains not only comment and summary but additional subject matter from the editor's knowledge and experience. Australian papers included are H. R. G. Poate's report on the treatment of 84 subjects of thyrotoxicosis with methyl thiouracil and Richard Flynn's report of seven cases of hirsutism of adrenal origin.

The section on metabolism and nutrition, edited by Tom D. Spies, covers a wide field. The first chapter contains a large selection of papers on the pancreas and liver, including the article by L. J. A. Parr and Eva Shipton, of Sydney, on the beneficial effects of yeast in *diabetes mellitus*. Malnutrition and therapy form subjects for separate sections, the rest of the material being grouped according to the anatomical systems. Reference is made to the paper by A. B. Corkill and J. F. Nelson, of Melbourne, on their investigation into the relationship between the pituitary and carbohydrate metabolism.

The production and general standard of the book are as commendable as ever. There is something of interest in it for every member of the medical profession.

A STUDY OF BONE MARROW CELLS.

CURRENT VIEWS on the development and differentiation of the cells of the blood and bone marrow are based on the standard methods of staining used, with only slight variations, since the time of Ehrlich. By the use of these methods, the reticular cells of the bone marrow are seen to be relatively small, with slightly basophilic cytoplasm and nuclei which are poor in chromatin. By division and maturation these cells give rise to the "stem" cells of the blood which are large and basophilic with complex nuclei containing conspicuous nucleoli. From this point onward the essential processes of maturation are the development of haemoglobin or of granules; these processes are accompanied by changes in the nucleus and disappearance of the basophilic character of the cytoplasm. Since our knowledge of this process is mainly derived from reactions to stains under artificial conditions it is of great interest to read of the application of a modern cytochemical technique to the study of living bone marrow cells. This is the theme of a small volume entitled "Studies on the Formation of Cellular Substances during Blood Cell Production" by B. Thorell,² which has also been published as a supplement to *Acta Medica Scandinavica*. The classical methods of differential staining of blood cells are thus now supplemented by ultra-violet microspectrography and microphotography in ultra-violet light. The ingenious microspectrographic method developed by T. Caspersson in the years 1936 to 1940 permits the quantitative measurement of light absorption in a single cell. The absorption of the purine and pyrimidine bases of polynucleotides at 2800 Å is so strong that 10^{-13} grammes of nucleic acid can be estimated within an area of 0.2 to 0.5 μ in diameter. Proteins which do not contain nucleic acid, on the other hand, have a characteristic absorption band at 2800 Å mainly due to their tryptophane and tyrosine content. Haemoglobin, finally, has a specific absorption at

¹"The 1947 Year Book of Endocrinology, Metabolism and Nutrition"; Endocrinology—edited by Willard O. Thompson, M.D.; Metabolism and Nutrition—edited by Tom D. Spies, M.D.; 1948. Chicago: The Year Book Publishers Incorporated. 7" x 43", pp. 576, with many illustrations. Price: \$3.75.
²"Studies on the Formation of Cellular Substances during Blood Cell Production", by B. Thorell: 1947. London: Henry Kimpton. 9" x 52", pp. 120, with many illustrations. Price: 12s.

about 4000 Å, due to its prosthetic group. Intense protein synthesis in the cytoplasm is regularly correlated with a high concentration (about 5%) of ribose polynucleotides in the cytoplasm. A correlation has been established in certain embryonic material between the heterochromatin of chromosomes, the nucleolus-associated chromatin, the accumulation of ribose polynucleotides in the nucleolus, the formation of basic proteins in the neighbourhood of the nucleolus, and the synthesis of proteins from cytoplasmic ribose polynucleotides in the region of the nuclear membrane.

These observations are now extended by Thorell's study of the bone marrow cells of men and mammals. In the development of both white and red cells, a decrease of cytoplasmic ribose polynucleotides from about 5% to below 0.5% occurs at a very early stage of development and is accompanied by an increase of cell protein; this process is more rapid in the red cell series than in the white. Haemoglobin synthesis normally does not begin until the concentration of cytoplasmic ribose polynucleotides has become very small. The haemoglobin content of the cell rises at first slowly, then rapidly while the cell volume decreases from 250 cubic μ to 150 cubic μ , and finally again slowly during the stages when the nucleus becomes pyknotic and is extruded; this later rise in haemoglobin concentration is mainly due to a further decrease in cell volume. The prosthetic group of haemoglobin to which the specific absorption is due, is thus certainly synthesized at a stage when the protein synthesis from ribose polynucleotides is practically completed. Thorell believes that the globin is synthesized during the earlier stage of protein synthesis, but there is no evidence that the protein at this stage is globin. The formation of the basophilic granules of the granulocytes, which like the formation of haemoglobin may be a functional differentiation, also occurs after the completion of protein synthesis.

In acute myeloid leucæmia the cytoplasmic and nucleolar ribose polynucleotides remain at a high concentration (above 5%) and do not show the usual decline after the first stage. Similarly in pernicious anaemia the cytoplasmic ribose polynucleotides do not decrease in concentration while haemoglobin is formed. In hemorrhagic anaemia, however, the decline of ribose polynucleotides follows its normal course, and only the synthesis of haemoglobin is decreased.

It would be interesting to apply Thorell's methods to the examination of the large primitive haemoglobinized erythroblasts of the very young embryo. The large haemoglobinized erythroblasts seen in erythroblastosis and the haemoglobinized normoblasts observed by Israels in chronic haemolytic anaemias might also provide interesting material.

This book represents an immense amount of patient and laborious work, but the presentation of the complex and difficult material is not so concise as one could wish; the argument of the writer cannot always be followed without effort. This is partly, but not entirely, due to occasional sentences of faulty construction and to a slight lack of facility in the use of the English language.

CANCER ASSOCIATED WITH BILHARZIASIS.

DR. M. A. AFIFI, the late Director of the Radiological and Electrotherapeutic Departments of the Egyptian Government Hospital, Alexandria, has summarized the results of more than twenty-five years' experience of bilharziasis and bilharzial cancer in his book "Bilharzial Cancer: Radiological Diagnosis and Treatment".¹ The book deals in turn with the relationship between bilharziasis and cancer, the radiological diagnosis of bilharzial cancer, and its treatment.

Afifi has collected statistics from the three main pathological centres in Egypt showing the number of cases of cancer in the various organs and the number of cases of cancer associated with bilharziasis. The association is closest with carcinoma of the bladder, which is much more frequent in Egypt than in Europe. Bilharziasis is present in association with 53% to 100% of vesical cancers, and with lesser percentage of cancers of the other pelvic organs. It is generally believed in Egypt that bilharzial infection is a cause of cancer, particularly in the bladder. Afifi discusses the association between the two diseases, but is cautious about accepting a causal relationship since bilharziasis affects 30% to 90% (according to locality) of the general population of Egypt, and frequent coexistence with cancer

is to be expected. The figures have not been subjected to a statistical analysis.

The second part—devoted to a discussion of the radiological diagnosis of bilharziasis and bilharzial cancer of the bladder and large intestine—occupies 54 pages.

If there are enough calcified ova in the bladder wall, the outline of the bladder, with perhaps other markings, may be seen in a simple radiogram. Thus a diagnosis of bilharziasis may be made in certain cases in which there are neither symptoms nor signs—a condition named by Afifi "concealed bilharziasis". A similar condition occurs also in the colon, but it is not so readily diagnosable owing to the movements of the intestine. The radiological features of bilharziasis, whether concealed or with complications, and particularly with associated carcinoma, are fully described and illustrated, and their differential diagnosis discussed. A feature of this section is the series of sixty clearly reproduced plates, constituting a radiological atlas of the disease.

In the third part Afifi describes the treatment of carcinoma of the bladder, full details being given of the various methods of radiotherapy. Only when the growth is treated while still small is there reasonable hope of cure. With more advanced growths deep X-ray therapy is palliative. The treatment of cancers of prostate, colon and rectum is also discussed, particularly in relation to radiotherapy.

Bilharziasis and its complications bristle with problems, and those who have to deal with them will benefit from Afifi's experience in diagnosis and treatment and will particularly appreciate the numerous radiological illustrations. The book may interest also those in countries free from bilharziasis who are concerned with the radiotherapy of cancer of bladder, prostate and rectum.

PRACTICAL BACTERIOLOGY, HÆMATOLOGY AND PARASITOLOGY.

It is ten years since the last edition of Stitt's "Practical Bacteriology, Haematology and Parasitology" appeared, and during that period advances in knowledge have brought many new techniques into routine use and many older ones have been laid aside, so that extensive revision was necessary.² The authors have availed themselves of the aid of various collaborators from the defence services in the recent war, whose large experience in the trial of techniques carries great authority. All this has been done with only a slight increase in size—a mere 20 pages—with the help of judicious pruning of older illustrations, small type in a number of sections, and slightly smaller margins. The type is admirable, and the quality and texture of the paper make it very pleasant to handle.

The bacteriology, presented by Dr. Brantham, follows the latest classification by Bergey; the section is completely rewritten and arranged. The general introductory part includes useful tables of diseases of animals transmissible to man, natural animal diseases and diseases which can be diagnosed with the aid of susceptible laboratory animals.

The technique of testing organisms for their sensitivity to penicillin is described in a small addendum by the editor, and is not given in as much detail as could be desired, while technical modifications of bacteriological diagnosis during the administration of antibiotic and bacteriostatic drugs to the patient, although mentioned under "media" at page 340, and "miscellaneous procedures" at page 373, are omitted from the section on blood culture, where they could very usefully be placed.

The discussion on rickettsiae and viruses is expanded and most informative, although the indirect method of diagnosis of virus disease by titration of antibody content of "paired sera", that is, one sample taken early in the illness and one during convalescence, is not mentioned. The antibiotic drugs are discussed at the end of the excellent section on medical mycology, which is the proper place from the point of view of their origin, but from the practical aspect, they could be better placed in relation to the susceptible bacteria. One wonders whether the brief sections on treatment appended to the descriptions of infectious disease are worth while; the principles should be self-evident from the text, and details are out of place in a diagnostic handbook.

The Wassermann test as such has been omitted; the complement fixation test of Kolmer is used as the classical one for the serodiagnosis of syphilis and is described with admirable care for detail, as also are the flocculation tests.

¹ "Bilharzial Cancer: Radiological Diagnosis and Treatment", by Mahmoud Ahmed Afifi, M.B., Ch.B. (Cairo), M.R.C.S. (England), L.R.C.P. (London), D.M.R.E. (Cambridge); 1948. London: H. K. Lewis and Company, Limited. 8½" x 5½", pp. 118, with 60 illustrations. Price: 16s. net.

² "Practical Bacteriology, Hematology, and Parasitology", by E. R. Stitt, M.D., Ph.M., Sc.D., LL.D., Paul W. Clough, Sc.D., and Contributors; Tenth Edition; 1948. Toronto: The Blakiston Company. 9" x 6", pp. 1007.

Hematology is presented in a new order: normal morphology, technical methods, abnormal morphology, and diseases of the blood comprise the subsections. The most noteworthy expansions here are three pages on Rh testing and the techniques for estimating iron content of the blood and for differential marrow counts. We would emphasize in large capitals the statement that "a thorough acquaintance with normal marrow is essential if valid conclusions are to be drawn regarding pathological changes"—especially in relation to the blood of children.

The section on parasitology owes to the United States Naval Reserve a vastly improved part on malaria, including techniques for parasite identification and mosquito dissection. The diagrammatic representation of life cycles of parasites needing an intermediate host are most useful.

Clinical examination of body fluids includes many new techniques—estimation of sulphonamides, thiocyanates, and blood alcohol. The thymol turbidity test now coming into favour in this country is not included in tests of liver function. The toad test for pregnancy is described in addition to the Aschheim-Zondek test. It is rather provoking to find a reference to the dithizone test for lead poisoning, but no description of the test itself.

The lists of anatomical weights could have been improved by tabulation and by the inclusion of figures for the newborn and the seven-year-old child.

However, these small criticisms are the result of detailed and careful perusal in the search for perfection. "Stitt" has always been a trusted friend in the majority of laboratories in Australia, and workers possessing the older edition will be satisfied with the excellence of the new.

THE ANATOMY OF THE NERVOUS SYSTEM.

THE second edition of Mettler's "Neuroanatomy"¹ has just been published. Like the first edition it comprises two major sections, one on gross anatomy, and the other on microscopic anatomy. This arrangement undoubtedly facilitates the organization of practical classes, but tends to make the book repetitive and cumbersome. The general style is dogmatic and gives little consideration to alternative opinions. There is a very imposing bibliography which, unfortunately, loses a great deal of its value from lack of specific chapter references. Illustrations are profuse. Many of them are good, but others are too small, crowded and detailed to be much more than confusing. In particular the series which illustrates the diencephalon and related structures is a very bad offender in this respect. It is a pity that the figures of the lateral geniculate body all seem to be taken from the macaque when they could just as easily have been taken from the human. It is possible to go through and find fault with many points. For example, there is no recognition of recent work which indicates that the motor supply to the bladder comes purely from the parasympathetic system; there is no mention of the possible topical localization in the pyramidal tracts, except at their origin; the geniculate bodies are still classed as metathalamus, a usage long since abandoned by most neurologists; and the extrapyramidal system is endowed with motor functions it has never been shown to possess. A new feature of this edition is that some consideration has been paid to the blood supply of the brain. This could be extremely useful, but in some respects it requires revision. In the first place, the author does not seem to have heard of Stopford's fundamental work on the blood supply to the spinal cord and brain stem. And secondly, his account of the basal arteries of the forebrain is taken almost entirely from the work of Duret and Charcot, dating back to 1874; no attention whatever is given to subsequent corrections by Heubner, Koitsko, Beevor, Aitken, Abbie and others. A striking feature is the attention paid to minute detail, often of dubious value, while many outstanding and really important points are glossed over or even ignored. Indeed, the confidence with which the author labels tiny cell collections in the brain stem, the identity of many of which is purely suppositious, is amazing. While the dogmatic tone of this book may recommend it to students, we feel that a great deal of the labour expended upon its production might have been more usefully concentrated upon presenting the subject in a more scientifically intelligible fashion.

¹ "Neuroanatomy", by Fred A. Mettler, A.M., M.D., Ph.D.; Second Edition; 1948. St. Louis: The C. V. Mosby Company. Melbourne: W. Ramsay (Surgical) Proprietary, Limited. 16" x 7", pp. 536, with many illustrations, some of them coloured. Price: 75s.

Books Received.

[The mention of a book in this column does not imply that no review will appear in a subsequent issue.]

"Edinburgh Post-Graduate Lectures in Medicine", Volume IV; 1948. Edinburgh, London: Oliver and Boyd. 9 1/2" x 6", pp. 604, with illustrations. Price: 18s.

Articles reprinted from the *Edinburgh Medical Journal*. There are 42 authors.

"Modern Methods of Infant Management (Before, During and After Birth)", by W. R. F. Collis, M.A., M.D., F.R.C.P., D.P.H., Ninian McI. Falkiner, M.D., Sc.D., F.R.C.P., F.R.C.O.G., P. C. D. MacClancy, L.R.C.P. and S.L. D.C.H., and M. Moran, S.R.N.; 1948. London: William Heinemann (Medical Books), Limited. 7 1/2" x 4 1/2", pp. 298, with illustrations. Price: 17s. 6d.

Described as being: "What the doctor should know that the nurse should know."

"The Skin Diseases: A Manual for Practitioners and Students", by James Marshall, M.D., B.S., M.R.C.S., L.R.C.P.; 1948. London: Macmillan and Company, Limited. 8 1/2" x 5 1/2", pp. 380, with illustrations, some of them coloured. Price: 20s.

Intended as a guide to diagnosis for students and as a reference book for practitioners.

"Textbook of Genito-Urinary Surgery", edited by H. P. Winsbury-White, M.B., Ch.B., F.R.C.S. (Edinburgh), F.R.C.S. (England); 1948. Edinburgh: E. and S. Livingstone, Limited. 9 1/2" x 6 1/2", pp. 1064, with many illustrations, some of them coloured. Price: 90s.

The work of forty contributors. It covers the urinary tract and the male genital system, from the surgical point of view.

"Methods in Medical Research", edited by Van R. Potter; Volume I; 1948. Chicago: The Year Book Publishers Incorporated. 9" x 6", pp. 390, with illustrations. Price: \$8.00.

The first volume of a series devoted to methods and techniques; a list of 49 contributors and reviewers is given.

"Textbook of the Rheumatic Diseases", edited by W. S. C. Copeman, O.B.E., M.D., F.R.C.P.; 1948. Edinburgh: E. and S. Livingstone, Limited. 9 1/2" x 6 1/2", pp. 624, with many illustrations, some of them coloured. Price: 50s.

The edited contributions of twenty-four authors.

"Fractures and Orthopaedic Surgery for Nurses and Midwives", by Arthur Naylor, Ch.M., M.B., M.Sc. (Sheff.), F.R.C.S. (England), F.R.C.S. (Edinburgh), foreword by Ernest Finch, M.D., M.S. (London), F.R.C.S. (England); Second Edition; 1948. Edinburgh: E. and S. Livingstone, Limited. 8 1/2" x 5", pp. 316, with many illustrations. Price: 17s. 6d.

For nurses in orthopaedic wards and for physiotherapists to show how principles are applied in orthopaedic surgery and to give an outline of orthopaedic conditions.

"Ear, Nose and Throat Nursing", by Jas. Hardie Nell, C.B.E., D.S.O., F.R.C.A.S., F.A.C.S., and T. Hardie Nell, D.L.O., F.R.C.A.S.; Fourth Edition; 1948. Auckland: Auckland Service Printery. 8 1/2" x 5", pp. 160, with illustrations.

Written mainly for senior nurses, but in part as a guide to resident medical officers.

"Textbook of Gynaecology", by Wilfred Shaw, M.A., M.D. (Cantab.), F.R.C.S. (England), F.R.C.O.G.; Fifth Edition; 1948. London: J. and A. Churchill, Limited. 8 1/2" x 5 1/2", pp. 672, with illustrations, some of them coloured. Price: 25s.

Written with the intention of presenting to students and practitioners an up-to-date account of gynaecology.

"An Introduction to Surgery", by Rutherford Morison, M.D., F.R.C.S. (Edinburgh), F.R.C.S. (England), M.A., D.C.L., L.L.D., and Charles F. M. Saint, C.B.E., M.D., M.S., F.R.C.S., F.R.A.C.S.; Fourth Edition; 1948. Bristol: John Wright and Sons, Limited. London: Simpkin, Marshall (1941), Limited. 8 1/2" x 5 1/2", pp. 342, with illustrations, some of them coloured. Price: 42s.

An attempt, through the consideration of general principles, "to aid the student in thinking out for himself the problems presented to him in the wards and in his text-books".

"The Queen Charlotte's Textbook of Obstetrics", by G. F. Gibberd, M.B., M.S., F.R.C.S., F.R.C.O.G., Arthur C. H. Bell, M.B., B.S., F.R.C.S., F.R.C.O.G., Hon. M.M.S.A., Douglas MacLeod, M.S., F.R.C.P., F.R.C.S., F.R.C.O.G., W. R. Winterton, M.B., F.R.C.S., F.R.C.O.G., H. G. E. Arthur, M.D., F.R.C.S., F.R.C.O.G., Brian Evans, M.B., B.Ch., F.R.C.S., F.R.C.O.G., Kathleen M. Robinson, M.D., F.R.C.S., F.R.C.O.G., and S. G. Clayton, M.D., M.S., F.R.C.S., F.R.C.O.G.; Seventh Edition; 1948. London: J. and A. Churchill, Limited. 9" x 6", pp. 590, with illustrations, some of them coloured. Price: 28s.

Showing the views held and the methods practised by the staff of Queen Charlotte's Maternity Hospital.

The Medical Journal of Australia

SATURDAY, DECEMBER 4, 1948.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: initials of author, surname of author, full title of article, name of journal, volume, full date (month, day and year), number of the first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

THE NUSSLER FOUNDATION.

THERE is a danger that institutions and organizations, such as the Nuffield Foundation, when they have become firmly established, may be taken for granted—that interest in their activities may wane. This would be unfortunate. Those in control of these bodies are always seeking ways of attaining their objectives and when, as the Nuffield Foundation has, these objectives have a strong medical bias, the doings of the body in question reflect in certain measure the progress of medicine; nay, they often help to achieve that progress. In September of last year the second report of the Nuffield Foundation was discussed in these columns. The third report for the year ended March 31, 1948, has been published and there are matters contained in it to which attention should be drawn.

It may be well to remind readers that the resources of the Foundation lie in the Nuffield Fund of £10,000,000 provided by Lord Nuffield, and in an auxiliary fund, "for which the trustees may accept gifts and bequests from other persons wishing to advance the objects of the Foundation". During the year under review the Foundation allocated grants amounting in all to £495,350—the largest allocation of any one year since the establishment of the Foundation. Since 1943 the allocation of grants amounts to no less than £2,135,980. Of this sum medical sciences have received £605,850; natural sciences have received £242,000; social sciences, £142,000; fellowships and scholarships, £509,900; the care and comfort of the aged poor, £589,700; and miscellaneous projects, £46,650. Nearly half the sum under the heading of fellowships and scholarships is accounted for by a promise of £225,000 (payable out of annual income over a period of fifteen years) to the Dominion Student's Hall Trust for the development of London House (see THE MEDICAL JOURNAL OF AUSTRALIA, August 30, 1947) and nearly all the sum expended on the care of old people has been in the form of a grant of £500,000 to the National Corporation for the Care of Old People (see THE MEDICAL JOURNAL OF AUSTRALIA, June 26, 1948). The auxiliary fund of the Foundation has received

during the year a gift of £450,000 from Captain Oliver Bird, M.C. This money, which is to be known as the Oliver Bird Fund, is to be held in trust "for the promotion of research into the prevention and cure of rheumatism and, if this should appear to the trustees at any time as undesirable, for the advancement of health and relief of sickness other than rheumatism". No indication is given of the way in which this money is to be spent, but it will be remembered that last year an announcement was made of the establishment at the University of Manchester of a research unit in chronic rheumatism. In the present report we read that with the grant to the University of Manchester the first regional diagnostic and research centre has been established for the study of the causes of chronic rheumatism and the improvement of facilities for its diagnosis and treatment. The attack on the disease at this university centre is planned on two broad fronts—a study of the clinical, sociological and occupational aspects of the disease, and a fundamental pathological research into the disease process. There is also a "peripheral" clinic dealing with the diagnosis and treatment of rheumatism in miners. The salary and expenses of the medical officer in charge of this clinic are provided by the Miners' Welfare Commission, but the medical officer is a member of the staff of the university rheumatism centre, and works under the direction of those controlling it. It is clear that the Nuffield Foundation has already in being a worth-while organization for the investigation of rheumatism; the ground to be covered includes the clinical, statistical, pathological and experimental fields, and the new benefaction should enable the investigation to be complete.

The next aspect of this report that should be mentioned is one which should be stated again and again and broadcast as widely as possible in view of the present-day tendency for many men to cast all their cares upon the State and to accept what the State gives them without question or demur. The Nuffield Foundation is approaching the end of its first five-year grant period and the trustees state that in preparing the programme for the second quinquennium they "are being guided by experience of the past and inspired by an unshaken belief in the continuing value of private venture". They go on to add that the welcomed increase of State support for learning and research does not lessen the need for voluntary enterprise. Neither does it decrease the importance of alternative sources of support, if the principle (fundamental to a free and democratic society) is to be upheld that "there should be room for more than one opinion and for more than one means of putting that opinion to the test". This obviously does not mean that a State action or a State opinion must necessarily be incorrect. Far from it. And it is to be noted that the Nuffield Foundation records with gratitude its cordial and helpful relations with official and other organizations. What the statement does call for is tolerance on the part of official and non-official persons, that the spirit of inquiry may be given free play, that opinions may be fearlessly expressed, and that the best result be sought regardless of its origin. This is needed in every part of the world today, and in Australia as much as in any other country. No one, except those who are prejudiced, can deny that the Nuffield Foundation is carrying out work that is for the betterment

of society, and the statements that it makes on the room for more than one opinion should carry weight.

Reference should be made to work that is being done in the social sciences. It is pointed out that in the past many exact and quantitative investigations have been directed to the wage-earners in the community and that work of this kind among the "middle class" has been neglected. This middle class is described as "the main repository not only of administrative and professional ability, but also of our cultural capital". It is thought that at the present time conditions of life and increasingly deliberate, but insufficiently validated, methods of selection may be changing the whole position and character of that class. The most important problem for the future of the middle class is stated to be their recruitment. If selection is to be investigated there must be available as quantitative a picture as possible of the actual conditions of middle class life. Such a picture would reveal the true economic and social difficulties of the persons concerned and would show whether the setting of their lives was such as to allow them to carry out their functions and occupy their proper place in society. A research is to be undertaken at the London School of Economics into social selection and differentiation—by social selection is meant the way in which movement within classes and from class to class takes place; by social differentiation is meant the attributes and significance of the positions attained. This news is interesting and the research will be difficult, mainly because class differentiation is, fortunately, much less pronounced than it used to be. In this country the problems of what are known as those of the "middle income group" are those that call for attention, and this group comprises persons who do work of great variety. However, we can only await the result of the research, which will extend over five years. Of possibly greater importance is a research that is to be undertaken at the Institute of Psychiatry of the University of London "to compare, over a sufficient period, the more traditional methods of selection with a procedure using various psychological tests, and to relate the assessment arrived at by these two methods with the subsequent careers of the individuals tested". This investigation will extend over ten years. An appropriate range of intelligence and personality tests will be devised and used, in addition to the present academic tests, on applicants for admission to various types of university. The results of the psychological tests will be used for research purposes only. It is not difficult to imagine many ways in which findings of this type of investigation could be applied.

At this stage it may be well to remind readers of the objects of the Nuffield Foundation—the advancement of health and the prevention and relief of sickness, the advancement of social well-being, and the care and comfort of the aged poor. These are alone sufficient to arouse the interest of every medical man and woman in Australia. But they have other reasons to think well of, and be grateful to, the Foundation, and among them is the establishment of the Dominion Medical Travelling Fellowships. These have been awarded to medical graduates from different parts of Australia and have served a dual purpose. They have been of great value to the individual doctor and so to his Australian colleagues and to the people among whom he practises on his return to this country. They have

also done something to promote knowledge and understanding in the Homeland of the Australian mind, of the Australian way of life and of Australian aspirations. This is something more important than most people realize, and something that must be pursued in a reciprocal fashion from every point of view if the peoples of the British race are to use their undoubted qualities, gifts and opportunities to the full in the service of humanity. There is therefore great satisfaction in the announcement that the Dominion Medical Travelling Fellowship will be continued for a period of seven years, Australia having the opportunity to nominate three Fellows each year, and that the Foundation is in the process of establishing Dominion travelling fellowships in the humanities and the natural and social sciences.

Current Comment.

MEASLES AND GAMMA GLOBULIN.

DURING the recent war serum albumin was produced on a large scale for use in the combating of shock in the United States forces. E. J. Cohn at Harvard undertook the fractionation of human plasma for this purpose and obtained amongst the by-products a substance called fraction II, containing a proportion of protein of about 16% as practically pure γ globulin and with the natural antibodies concentrated twentyfold to thirtyfold. Clinical trial of this material in the prevention and attenuation of measles produced favourable results. Circumstances did not permit the production of γ globulin in the United Kingdom during the war, but in July, 1943, Cohn sent over a litre of the substance, and a subcommittee for its trial was set up under the chairmanship of Sir Percival Hartley. The results form the first part of a report submitted to the Blood Transfusion Research Committee of the Medical Research Council.¹ The report also covers a later investigation of the relative effectiveness of a series of commercially prepared samples of γ globulin, and the trial of batches of γ globulin that had been classed as out of date. The detailed results of the investigations will repay careful study, but certain general conclusions in the report may be stated briefly. It was found that γ globulin prepared by Cohn's method contained measles antibodies in high concentration. In a comparative trial in which 136 measles contacts were given convalescent measles serum and 139 contacts were given γ globulin, the volume of γ globulin required for the prevention and attenuation of measles was found to be about half the volume of convalescent measles serum required, but, though superior in action to convalescent measles serum, γ globulin in the doses used in the trials did not always give full protection; some degree of attenuation was, however, obtained in almost all cases. In the investigation of the theoretically out-of-date material, samples examined nearly two years after their preparation (the period of effectiveness being stated as one year) showed high protective and attenuating properties, "differing but little from others which had been in circulation for a shorter time". The importance of this finding is pointed out in relation to the estimation of material to be ordered at the beginning of an epidemic; it is important to know if unused stocks can be carried over to the following year. In conclusion the report affirms that no local or general reactions followed the injection of γ globulin. Altogether these findings are favourable and advance further an important line of investigation. As is stated in a leading article in the same issue of *The Lancet*, measles is not the killing disease it was, but it may still be a serious infection in young children and lead to crippling complications like *otitis media* and *bronchopneumonia*. Its

abortion or attenuation in very young children is most desirable. Convalescent serum is limited in supply; its use is not without a slight risk and is not completely effective. If its production can be arranged, γ globulin is likely to be of greater value against measles, and there are indications that it may prove useful in other virus conditions. Perhaps the answer to the problem of rubella during pregnancy lies in or near it.

HYPERTENSION AND THE RICE DIET.

It will be remembered that at a recent meeting of the Federal Council of the British Medical Association, reported in the issue of September 18, 1948, the vexed question of the supply of rice was raised, not for the first time, and it was resolved after discussion that the Department of Commerce and Agriculture should be asked to facilitate the supply of rice to patients suffering from hypertension who produced a certificate from a legally qualified medical practitioner. This system of treating hypertension with rice is due essentially to Walter Kempner, of the Duke University School of Medicine. Kempner has been reporting his results from this form of therapy since 1944, and in a comprehensive summary of the method published this year they certainly appear impressive. He declines to accept subjective improvement as evidence of success in therapy, requiring objective effects, such as decrease in blood pressure, reduction in heart size, loss of oedema and improvement in changes in the electrocardiogram and *fundus oculi*. The report covers the effect of the diet on 500 patients with hypertensive vascular disease, "most of whom were seriously ill and had failed to respond to other forms of treatment". It was ineffective for 178 patients, though this includes 26 patients who were in a critical condition when started on the diet and who died after an average period of thirty-nine days. For 322 patients the diet proved beneficial, that is to say, it was followed by one or more of the following: decrease in "mean" arterial blood pressure of at least 20 millimetres of mercury; reduction in heart size with change in the transverse diameter of 18% or more; a change in the T wave in lead I from completely inverted to upright; disappearance of severe retinopathy. These results are presented not only in table and graph form, but also in representative electrocardiograms and photographs of fundi; the objective changes are undeniable and in some cases, notably in the disappearance of papilloedema, retinal haemorrhages and exudate even with a persistence of the hypertension, they are most striking. Reduction in the systolic and the diastolic blood pressure occurred in a high proportion of cases and at times exceeded the reduction produced with "Sodium Amytal" under test conditions before the institution of the diet. Improvement in the other features mentioned was not, however, dependent upon a reduction in hypertension. Kempner points out that the rice diet is more rigid than any of the fat-poor, salt-poor or protein-poor "hypertension" diets. It contains in 2000 Calories not more than five grammes of fat and about twenty grammes of protein derived from rice and fruit, and not more than 200 milligrammes of chloride and 150 milligrammes of sodium. A patient takes an average of 250 to 350 grammes of rice (dry weight) daily; any kind of rice may be used provided no sodium, chloride, milk *et cetera* has been added during its processing. The rice is boiled or steamed in plain water or fruit juice, without salt, milk or fat. If the sodium concentration of the plain water available is greater than twenty milligrammes per litre, distilled water should be used. All fruit juices and fruits are allowed, with the exception of nuts, dates, avocados and any dried or canned fruit or fruit derivatives to which substances other than white sugar have been added. Not more than one banana a day should be taken. White sugar and dextrose may be used *ad libitum*. Tomato and vegetable juices are not allowed. The fluid intake is limited to 700 to 1000 millilitres of fruit juice per day. Supplementary vitamins are

added in the following amounts: vitamin A 5000 units, vitamin D 1000 units, thiamine chloride five milligrammes, riboflavin five milligrammes, niacinamide 25 milligrammes, calcium pentothenate two milligrammes. During the first period of "regulation" on the diet, the patient should be under constant medical supervision, and findings on chemical examination of the blood and urine should be checked frequently. Rest in bed, unless the severity of the condition demands it, is neither necessary nor desirable. As a rule the diet should be continued without modification until those conditions which were the indication for its use have disappeared. Then small amounts of non-leguminous vegetables, potatoes, lean meat or fish (all prepared without salt or fat) may be added. But only so much additional food should be allowed as can be taken without undesirable effects. When a critical condition of heart, kidney or retina exists, the strict rice diet should be continued indefinitely, provided that the equilibrium is maintained between intake and loss of those substances which are indispensable for the body. The indications for the use of the diet, according to Kempner, are all serious instances of acute and chronic nephritis, heart failure which does not respond to other treatment, and arteriosclerotic and hypertensive vascular disease with cardiac, cerebral, retinal or renal involvement. It should be tried in uncomplicated hypertensive vascular disease when a more liberal regimen has failed and should be used as a therapeutic test before sympathectomy is considered. It should not, however, be used indiscriminately, for example, for moderate simple hypertension, and investigation of causes of hypertension should not be overlooked. Its use is contraindicated unless frequent checks of the patient's blood and urine by chemical examination are possible.

Kempner discusses in some detail the chemical changes following use of the diet and refers to theories put forward to explain its effects. These have been related to restriction of sodium intake and alterations in cholesterol metabolism, but the question requires further study. H. A. Schroeder¹ was unable to demonstrate any special advantage in the use of Kempner's diet as compared with a normal diet with a similar content of salt and draws attention to the possible dangers associated with the rice diet. These have been further stressed by J. Brozek, C. B. Chapman and A. Keya², who give details of an experiment on normal young men in Minnesota and of observations in Leningrad during and after a period of severe dietary restriction. In both cases drastic restriction of diet resulted in a lowering of blood pressure. During the recovery phase the Minnesota subjects were not adversely affected, but in Leningrad, a group perhaps more representative of the general population, an epidemic of hypertension and hypertensive cardio-vascular disease followed the lifting of the siege. These circumstances may not be strictly comparable to the conditions of the Kempner regimen in which the diet is theoretically in caloric and nitrogen balance. Whether, however, patients taking an inevitably dull diet adhere strictly to instructions is another matter and they may suffer from deficiency of Calories. Brozek and his colleagues consider that the Minnesota and Leningrad experiences suggest the possibility that the patient may be worse off, when he modifies or abandons his dietary restrictions, than he was before treatment was started, so that careful selection of patients for treatment by the Kempner regimen is essential, and the patients should be warned that instructions must be followed carefully and that modifications, particularly if sudden, may be dangerous. As they suggest, there can be no objection to the Kempner regimen for the treatment of severe and especially of malignant hypertension, but for less severe disease, particularly in obese subjects, it appears unwise to employ such severe dietary restrictions. A reducing diet may be all that is required. With these comments Kempner would probably agree. His regimen appears to be a valuable contribution to the treatment of hypertension, but its value depends essentially on the wisdom of its application.

¹ The American Journal of Medicine, April, 1948.

² The Journal of the American Medical Association, August 28, 1948.

Abstracts from Medical Literature.

GYNAECOLOGY.

Culdoscopy: A Useful Gynaecological Procedure.

EXPERIENCES with the use of the culdoscope in gynaecology are described by R. W. TeLinde and F. Rutledge (*American Journal of Obstetrics and Gynecology*, January, 1948). Technically the instrument is used with the patient in the knee-chest position. It is introduced preferably with the use of local anaesthesia, through a puncture wound in the posterior fornix. The uterus, tubes, ovaries, broad ligaments, utero-sacral ligaments, infundibulo-pelvic ligaments, rectal wall, sigmoid, small intestines, and often the caecum, appendix and even the ureters can be visualized. In their series of 56 cases the authors found that the greatest indication was the possibility of tubal pregnancy, and 37 examinations were made for this purpose. In five cases the diagnosis of tubal pregnancy was made and confirmed by operation. In the 32 cases remaining the negative diagnosis was subsequently confirmed clinically. Culdoscopy can be useful in the diagnosis of lower abdominal pain, the detection of early endometriosis, differentiation between salpingitis and endometriosis or between salpingitis and appendicitis, the diagnosis of ovarian enlargements, the investigation of the physiology and anatomy of the ovaries in endocrine disturbances, and investigation of the pelvic pathological change in sterility. The chief contraindication is the presence of a fixed mass in the cul-de-sac. No instances of hemorrhage, peritonitis or injury to a viscous occurred in this series of cases.

Abdominal Colpocystopexy for Complete Prolapse of the Bladder and Vagina.

PAUL F. FLETCHER (*American Journal of Obstetrics and Gynecology*, July, 1948) describes an operation for the cure by an abdominal approach of complete prolapse of the vagina, a condition characterized by eversion of its walls to such an extent as to cause complete exteriorization and eversion, carrying with it the bladder anteriorly and bowel posteriorly. It is more common in women who have undergone hysterectomy. The ureters are first catheterized; then the anterior vaginal wall is separated from the bladder by sharp and blunt dissection down to the uretero-vesical junction on each side. The cul-de-sac is then closed by superimposed purse-string sutures between the vagina, rectum and lateral pelvic walls according to the technique of Moschowitz, the lowermost suture being placed about one inch above the inferior extremity of the cul-de-sac and the folds of the sacro-uterine ligaments in the uppermost suture. Care must be taken to avoid injury to the internal iliac vessels and the ureters. The next step consists of fixation of the vagina. If the vaginal cuff is long enough ventral fixation may be performed; if it extends only a short distance onto the posterior aspect of the distended bladder wall

it is included in the distal end of the fascial strips with the "crossed-suspender support" applied to the bladder. If it extends well up onto the bladder wall it is sutured to the strips after they have been attached to the bladder. The latter seems to be the method of choice. The fascial strips, 1.5 centimetres wide and approximately 8.0 centimetres in length, are cut from the anterior sheath of the rectus 1.5 centimetres lateral to the cut edge and mobilized in such a manner as to permit the base of the strip to be situated about 6.0 centimetres above the *symphysis pubis*. The strip must be long enough to reach the uretero-vesical junction on the opposite side when the bladder is distended, and is carried to this position through muscle and parietal peritoneum; the end should be touching but not attached to the wall of the ureter when the sutures are inserted. Sutures of fine non-absorbable material placed approximately one centimetre apart are used to attach the lateral borders of the strip to the muscular portion of the bladder wall. The strips should cross on the inferior aspect of the bladder wall as close to the posterior border of the trigone as possible. Favourable results from operations on seven patients to date are reported; the first was performed in 1940.

The Syndrome of Ovarian Pain and Insufficiency.

GEORGE P. HICKEL (*Surgery, Gynecology and Obstetrics*, March, 1948) has reviewed a series of carefully observed patients with ovarian pain. He considers this condition essentially due to ovarian dysfunction and holds that it can occur in the absence of any demonstrable lesion of the ovary. By clinical observation and analogy with known reactions of the ovary in animals, the possible mechanism of ovarian failure is suggested. If much more than half of the ovarian tissue is removed, failure of ovulation and cystic changes result. Removal of one ovary results in increased activity and corresponding hypertrophy of the remaining ovary. The author has analysed three groups of patients with ovarian pain. In the first group ovarian tissue had previously been removed because of ovarian pain; in the second group no surgery had been performed on the ovaries for pain; and in the third group patients with cyclic intermenstrual pain (*Mittelschmerz*) have been considered. In the first and third groups the pain and other symptoms of ovarian failure were relieved by oestrogen therapy and in the second group the administration of oestrogen was followed by relief of pain in three out of every four cases. In the most severe cases when pain was constant and incapacitating oestrogen was ineffective and only temporary relief was afforded by operations such as section of the albuginea, bilateral section of the ovarian plexus and vessels, and presacral and bilateral lumbar sympathectomy. Chronic inflammatory disease of the adnexa and endometriosis have signs and symptoms in common with this condition, but pelvic findings are always normal in these cases even after years of symptoms. Given to patients with typical cyclic intermenstrual pain, large doses of oestrogen relieve pain by preventing ovulation but it was found that smaller doses of oestrogen reduced the pain to

insignificance without preventing ovulation. The author considers that both cyclic and irregular ovarian pain are different manifestations of the same process and oestrin may produce its beneficial effect by improving the blood supply of the ovary. The uterus must be considered in any theory of ovarian dysfunction on account of its ability to cause periodic fluctuations in the circulating volume of oestrogen which influence the gonadotropic hormone and then the ovary. The uterus plays an active part in the functional balance of the ovary and pituitary and can be considered as the balancer on a see-saw with the ovary at one end and the pituitary at the other. If either the balancer (uterus) or either of the riders (ovary or pituitary) gets out of balance inadequate activity results and normal function ceases.

Vaginal Repair Combined with Vaginal Hysterectomy.

J. E. HARRISON (*American Journal of Obstetrics and Gynecology*, March, 1948) discusses the advantages and disadvantages of combined vaginal hysterectomy and repair in the treatment of procidentia and considers that the operation affords distinct advantages in selected cases over any other form of treatment. He describes his technique in detail with diagrams. The important pelvic supporting structures are briefly stated and comprise the endopelvic fascial diaphragm with its components of pubo-cervical layer, Mackenrodt's ligaments, and utero-sacral ligaments; the smooth muscle diaphragm in the layer of the broad ligament between the endopelvic fascial diaphragm and the upper surface of the *levator ani* muscle; the *levator ani* muscular diaphragm; the urogenital diaphragm; the perineal body and the broad and round ligaments which can be used for support after vaginal hysterectomy. The Manchester operation may not be enough if the uterus is large and the ligaments are poor or if high rectocele or enterocele is present. Vaginal hysterectomy offers ease in the complete management of all conditions related to prolapse. The sagging uterus is removed and free access given to all supporting structures. The author does not agree with the statement that the uterus is better left to act as a central supporting hub to which the stretched ligaments can be fastened. The operation is more difficult and time-consuming than other pelvic repair operations, but this is not to be considered in view of its other great advantages. A very real indication for this operation occurs in those patients on whom previous inadequate repair has been carried out. The author considers that gynaecologists in general should be encouraged to perform the operation of vaginal repair combined with vaginal hysterectomy for the cure of procidentia.

Chronic Salpingitis.

H. N. SHAW AND JOHN GASPAR (*The Western Journal of Surgery, Obstetrics and Gynecology*, February, 1947) have reviewed the case histories of 3242 patients with the diagnosis of chronic salpingitis and have analysed the records of 759 patients who were treated surgically. Total and differential leucocyte counts and sedimentation rate tests are considered of great value in determining the optimum time for

operation. Of the patients, 343 received medical treatment for two to three weeks or longer before operation was considered wise. Adequate pre-operative care, with intravenous administration of fluids or transfusions, Wangenstain suction or Miller-Abbott régime, is important for the success of major pelvic surgery. Diagnostic curettage should precede the operation as unsuspected malignant disease may be found. The appendix should always be removed at operation unless the condition of the patient is unsatisfactory at the time. Ovarian transplants are not performed frequently, now that potent oestrogens can be easily and cheaply administered. The authors are of the opinion that the uterus should be removed when bilateral salpingectomy is required. Supravaginal hysterectomy preceded by cauterization of the cervix is preferable to total hysterectomy in patients with extensive pelvic inflammation. Efforts to determine the value of sulphonamides led to no conclusions. It is recognized that these drugs are of value in initial attacks and in exacerbations of chronic conditions. The sulphonamides do not affect old chronic "pus tubes" or walled-off abscesses. When infected material has escaped within the abdomen during operation, the local application of sulphonamides in doses of five to eight grammes is of great value. Among the 759 patients treated surgically there were eleven deaths after operation. The authors state that the outstanding cause of death after operations for pelvic inflammatory disease is general peritonitis.

OBSTETRICS.

Acute Anterior Poliomyelitis in Pregnancy.

E. S. TAYLOR AND J. M. SIMMONS (*American Journal of Obstetrics and Gynecology*, July, 1948) had the experience of working through an epidemic of poliomyelitis in Colorado, United States of America, in 1946. There were 900 new cases reported, and of these 113 were among women between the ages of seventeen and forty years. They report on the 25 patients who were pregnant; 17 of these were treated by the staff of the University Hospital. In this epidemic the pregnant women had one chance in one thousand of contracting the disease; this was twice the rate for the non-pregnant group and it was statistically proven that pregnant women have a predilection for the disease. Of the 25 acute infections accompanied by pregnancy eight appeared in the first trimester, eleven in the second and six in the third; eight of the nine months were represented. Women in all months seemed to be equally susceptible to the disease. During the first two trimesters the prognosis for recovery is excellent. There were nineteen patients in the first and second trimesters with no fatalities and only two with significant residual paralysis. This is compared with a group of 88 non-pregnant women aged between seventeen and forty-one years who had poliomyelitis during the epidemic; 66 had the paralytic form and seven died. The authors consider it a possibility that in the first six months of pregnancy the

disease is more easily contracted but milder. The six patients who fell ill in the last trimester had a very different and tragic course. Three died from bulbar paralysis; a fourth with bulbar involvement nearly died upon numerous occasions and now has quadriplegia and diaphragmatic paralysis. The other two patients have severe residual paralysis. Although the series is small, the mortality rate of 50% in the last trimester greatly exceeds that of 6% for the entire epidemic and 8% for the 88 non-pregnant women in the age group under consideration. The authors present collected statistics to support their observations that the mortality is higher in the last trimester—of 110 first and second trimester patients there were eight deaths or a 7% mortality rate. On the other hand among 85 last trimester patients 23 died from bulbar paralysis. The authors postulate that oestrene and progesterone, which may have been protective in the early months, may become virucidal to such a degree in latter months as to produce a Herxheimer-like reaction. They explain the pregnant woman's susceptibility to the disease as being the result of congestion and increased permeability of the upper respiratory and digestive tracts and chronic fatigue. The obstetric end results in the 25 cases were as follows. Two patients aborted early and at the time of their acute infection; there were no cases of poliomyelitis or congenital deformities in the newborn. There were two sets of twins, and 24 viable infants have been delivered. The degree of maternal spinal paralysis had no effect on the labour; the uterine contractions proceeded just as in a non-paralysed patient. Low forceps had to be used in some cases owing to poor voluntary expulsive efforts by the mother. Post-mortem Cæsarean sections were performed on two women—one at the thirty-second week and the other at the thirty-seventh week.

Irradiation for Ovarian Dysfunction.

DELLA G. DRIPS (*American Journal of Obstetrics and Gynecology*, May, 1948) presents a study of 331 cases of typical functional menstrual irregularities treated by irradiation at the Mayo Clinic during the years 1927 to 1941. Of the patients 136 were single at the time of treatment; 63 were considered to have primary pituitary failure and 73 ovarian failure. Direct reestablishment of menses occurred in 46 from the pituitary group and 43 from the ovarian group. When the amenorrhoea had been present for more than one year the percentage of success in both groups was correspondingly less. Twenty-five of these single women subsequently married and became pregnant and had 40 pregnancies; two of the pregnancies ended in miscarriage and one patient gave birth to a monster. The author considers that there is no late harmful effect on the ovaries. Of the 123 young married women, 34 (27.6%) became pregnant directly after treatment. Eighty-two women stated that their menstrual periods were more regular after treatment; of these 45 had been pregnant, the outcome being 67 full-term pregnancies, one monster, ten abortions and two ectopic pregnancies. The author comments that of the two groups of patients who

have the amenorrhoeic type of menstrual irregularity the group in which pituitary failure is held to be responsible responds best to treatment unless the atrophy of the genital tract has become irreversible. She considers it best to establish a normal basal metabolic rate by means of thyroid extract and to try cyclic administration of hormones (principally oestrogens) for several months before giving irradiation. Before potent oestrogens were available for cyclic administration it was found that the effects of irradiation would cease after three to four months and treatment would have to be repeated. Now, once a cycle or regularity for a few months has been established with oestrogen, the periods continue to occur regularly. No severe side effects from radiation have been observed.

The Intrauterine Pack in the Management of Post-Partum Haemorrhage.

LOIS A. DAY, ROBERT D. MUSSET AND ROBERT W. DEVON (*American Journal of Obstetrics and Gynecology*, February, 1948) state that control of post-partum haemorrhage continues to be one of the highly important problems in obstetrics, for, despite a striking decrease in the maternal death rate in the past decade, maternal mortality caused by obstetric haemorrhage has remained constant. They report on the use of the intrauterine iodoform pack or tamponade for this purpose. The employment of this has always been a controversial matter—one school holding it to be unphysiological in that the uterus is distended and the uterine sinuses are held open, whilst others assert that the pack acts as a tamponade and serves as a foreign body to stimulate uterine contractions. The authors use a standard technique in the management of the third stage of labour with the injection of one millilitre of "Pitocin" during the delivery of the head and shoulders, followed by simple expression of the placenta, Credé's expression or manual removal according to indications. After delivery of the placenta the fundus is massaged and further oxytocics are administered. If bleeding continues in spite of treatment the uterus is firmly packed with sterile iodoform gauze, uterine packing or placental forceps being used. In cases of severe bleeding from an atonic uterus, the vagina also is packed tightly. In 12,000 deliveries at the Mayo Clinic from 1918 to 1945, the uterus has been packed 267 times; in 106 of these the reason given was persistent uterine haemorrhage after the third stage of labour. In 46 cases the packing was carried out after manual removal of the placenta, although no significant haemorrhage had appeared, and in 57 cases for an atonic uterus after cessation of bleeding. Six patients continued to bleed through the pack; in three cases repacking controlled the bleeding, but in two hysterectomy was performed and in the other there was a ruptured uterus for which hysterectomy was performed. The morbidity rate was 10.9% and one patient died of haemolytic streptococcal infection—this was prior to the advent of chemotherapeutic agents. The authors conclude that available evidence indicates that the intrauterine pack has a definite place in the control of post-partum haemorrhage.

The Royal College of Obstetricians and Gynaecologists.

A MEETING of the Victorian Branch of the Royal College of Obstetricians and Gynaecologists was held at the Women's Hospital, Melbourne, on November 7 and 8, 1947.

Artificial Rupture of the Membranes.

Dr. W. LEMMON read a paper entitled "The Management of Delayed Response to Artificial Rupture of the Membranes as a Method of Inducing Labour" (see page 649).

Dr. ARTHUR HILL said that Dr. Lemmon had given them a clear and balanced account of his views of the problem based on an analysis of over a thousand cases, and in doing so he had covered a wide field with great ability. With the majority of the conclusions he had reached Dr. Hill was in entire accord. He said that he would refer only to certain points of detail which Dr. Lemmon had had to omit, or on which their attitude or their emphasis differed.

Dr. Hill raised the question to begin with as to what standard of performance they should expect from artificial rupture of the membranes. In properly selected and conducted cases the method was simple, swift and sure. Its efficiency increased after the thirty-fourth week of pregnancy and was at its maximum within one or two weeks on either side of term. Other requirements for consistent success were a vertex presentation in which the head fitted well down into the pelvis and onto the cervix, or at least could easily be pushed down into that position, and a short soft, easily dilatable cervix, what the Americans called the "ripe" cervix. Under such conditions, which might be said to imply adequate hormonal preparation, correct mechanics and efficient uterine action, artificial rupture of the membranes was followed by a latent period of perhaps a few hours and by a labour which was almost invariably shorter than normal.

Dr. Hill went on to say that abnormal delay following artificial rupture of the membranes might be considered from three aspects—the reasons for delay, the dangers of delay, and the management of delay.

Dealing first with the reasons for delay, Dr. Hill said that by far the commonest and most important cause of delay was the effect of unsatisfactory mechanics. Other causes were poor operative technique and certain indeterminate or unpredictable factors such as inadequate hormonal preparation of the uterus, inefficient uterine action, poor dilatability of the maternal soft parts, and deficient mouldability of the fetal skull. The mechanics would be unsatisfactory if the bullet did not fit the barrel, but was too large, or was of the wrong shape, or was inaccurately applied, or was disproportionately small. In so far as was possible, the wise obstetrician therefore avoided that method of induction in cases in which there was evidence of mal-presentation, disproportion, malposition (including the "floating" head and the "unripe" cervix), or marked prematurity.

The dangers of delay for both mother and baby might be three in number: (a) infection; (b) persistence or exacerbation of any diseased state already present (for example, toxæmia of pregnancy, fetal erythroblastosis); (c) dry labour. Infection was the commonest and usually the greatest danger that accompanied delay. It was so intimately bound up at all stages with management that it would be logically dealt with under that section. The effects of delay on any diseased state of the mother or baby depended on the individual circumstances and did not permit of generalization. Dry labour was not likely to ensue unless there was clear-cut disproportion with steady drainage of liquor, and surgical induction should not be performed in such cases.

Speaking of the management of delay, Dr. Hill said that, as Dr. Lemmon had pointed out, the secret of avoiding a delayed response rested ultimately on a wise selection of material for induction. At its best that was a counsel of perfection, for there were occasions when, although the conditions were by no means completely satisfactory for artificial rupture of the membranes, the method was indicated because of the undoubted advantages which would attend its success. He believed that medicinal stimulation was of value employed before artificial rupture of the membranes, for in a considerable proportion of cases it appeared to aid in "priming" the uterine muscle and "ripening" the cervix. In cases of toxæmia or when delay might be anticipated, large doses of stilbestrol had their place. The operative procedure should include dilatation of the cervix, wide stripping up

of the membranes, and release of at least half a pint of liquor. A tight binder should then be applied.

When delay occurred management had to be directed to combating the known causes of danger to mother and child. In grave or rapidly progressive toxæmia, or frank disproportion, that might mean recourse to another method of delivery such as Cesarean section. The subject of infection was much more complex. If the genital tract contained bacteria pathogenic to the mother or baby it was almost inevitable that the danger would steadily increase as time went on. Certain bacteria such as the anaerobic streptococci tended to produce their chief ill-effects in the mother, while others, such as *Bacillus coli* and, at times, the Gram-negative anaerobic bacilli, were particularly likely to be a danger to the *fetus in utero*. In the absence of a frank vaginal discharge or general symptoms, however, there were no clinical aids to the diagnosis of potential or actual infection of the genital tract. It was therefore clear that the only chance of consistently anticipating and effectively controlling infection lay in proper bacteriological investigation performed before or shortly after surgical induction and repeated as required.

Dr. Lemmon had spoken of the highly efficient bacteriological service introduced at the Women's Hospital by Dr. Butler. There, as a routine, a vaginal swab for smear examination and incubation was taken twenty-four hours after artificial rupture of the membranes and was repeated daily until delivery; it was also taken immediately if there was fever. An immediate bacteriological report was made upon the smear and, if the findings indicated the advisability, appropriate chemotherapy was at once begun and was continued for at least five days if there was no clinical infection, or for two to three days after all clinical signs of infection had subsided. Dr. Lemmon's paper had not brought out the extent to which that integrated bacteriological service had reduced not only the incidence and severity of maternal morbidity due to infection, but also the fetal mortality. The service had also widened the field of availability of artificial rupture of the membranes as a method consistent with good obstetrics.

Dr. Hill said that it was his belief that the dangers of infection could be still further reduced. In his own practice when there was reason to suspect that surgical induction might be associated with delay or the need for further operative procedures, a vaginal swab for smear examination and incubation was always taken before induction was carried out. The bacteriology of the genital tract then acted as a scientific directive to both the time and the method of surgical induction and chemotherapy.

Dr. Lemmon had quoted a fetal death rate of 30% when delivery was delayed for more than forty-eight hours after artificial rupture of the membranes. Dr. Hill considered that that figure was a good deal too high. In that context he would not accept unquestioningly the diagnoses of prematurity, intrauterine asphyxia or maceration unless he knew the exact conditions at autopsy. In private practice it appeared to be the exception for an autopsy to be performed after stillbirth or neonatal death. They should combat the attitude which condoned that deficiency. They would not discover the true place of intrauterine infection as a cause of fetal death until autopsy after stillbirth and neonatal death was a routine measure and included a complete bacteriological investigation.

Dr. Hill said that he would conclude by referring to four illustrative cases. The first was that of a woman, aged thirty-five years, who in December, 1943, had had artificial rupture of the membranes performed for toxæmia in the thirty-fourth week of her third pregnancy. The fetal head was then high and the cervix closed, and examination of a vaginal swab revealed Döderlein's bacilli only. Two days after induction the result of a vaginal swab examination was the same; three days still later examination of a vaginal swab revealed only Döderlein's bacilli in smears and occasional *Bacillus coli* in culture. One week after induction examination of the vaginal swab revealed Döderlein's bacilli only. Later that same day the patient came into labour and three hours later was delivered of a living male weighing five pounds.

The second case concerned a woman, aged thirty-seven years, who gave a history of having in 1941 been for five and a half days in labour and having a difficult delivery of a stillborn baby weighing seven and a half pounds. Her second pregnancy was due to terminate on October 15, 1944, and ten days before that artificial rupture of the membranes was performed. The fetal head was then high, but could be pushed temporarily into the pelvis, and the cervix was long, scarred and tight, with dilatation to one finger's width. There were no signs of toxæmia, and examination of the vaginal swab revealed occasional anaerobic streptococci only. Two days and again four days after induction examination

of the vaginal swab revealed only occasional anaerobic streptococci and practically no pus cells. Seven days after induction the patient suddenly collapsed with a pulse rate of 132 per minute and temperature of 96° F.; there was severe steady abdominal pain and the fetal heart sounds were not heard. Examination of a vaginal smear showed fewer anaerobic streptococci than before and no pus cells. Three hours later the patient delivered herself spontaneously of a living baby weighing six pounds ten ounces, and one-third of the placenta was found to be separated by accidental hemorrhage.

Dr. Hill remarked that in both of these cases the delay following surgical induction was great, but it was unaccompanied by anxiety as to infection and no chemotherapy was given.

The third patient, a *primigravida*, aged twenty-eight years, had in April, 1946, developed mild toxæmia of pregnancy when fifteen days past term. The fetal head was unfixed and lying in a posterior position, but appeared as if it would enter the pelvis. Three days later the membranes were ruptured instrumentally and in a few hours the patient went into labour. After twenty-eight hours' labour the baby was turned under general anaesthesia from a posterior to an anterior position; and at that stage examination of a vaginal swab revealed many anaerobic streptococci and Gram-negative anaerobic bacilli. Forty hours after surgical induction the fetal heart was not heard, although its rate previously had remained consistently between 116 and 144 per minute. Forty-two hours after surgical induction a difficult forceps delivery was performed, aided by deep episiotomy, cleftotomy and strong abdominal pressure. The baby, which had apparently been dead for some hours, weighed eight pounds, and autopsy revealed bilateral bronchopneumonia as the cause of death; anaerobic streptococci and Gram-negative anaerobic bacilli were recovered in pure culture from the pulmonary lesions. In that case bacteriological investigations had been begun too late, the significance of the findings to the baby was not fully realized and chemotherapy was omitted.

The last patient discussed by Dr. Hill was a *primigravida*, aged thirty-eight years, who developed toxæmia of pregnancy when twelve days past term. The foetal head was fixed tightly in a transverse position in the pelvic brim and the cervix was effaced, with its thin, rigid rim admitting one finger. Twenty-four hours after onset of the toxæmia artificial rupture of the membranes was performed and labour commenced in a few hours. At that stage examination of a vaginal swab revealed some anaerobic streptococci and a few other anaerobes. Labour progressed slowly and the toxæmia increased, with the systolic blood pressure rising to 180 millimetres of mercury and the urine becoming one-third "solid" with albumin. Twenty-four hours after induction the vaginal flora was more profuse, and combined sulphonamide and penicillin therapy was begun. Further progress of labour was not satisfactory, and forty hours after artificial rupture of the membranes lower segment Cæsarean section was performed under local anaesthesia with delivery of a living female weighing seven pounds ten ounces. Both local and systemic chemotherapy were employed at operation and full systemic chemotherapy was continued for another six days. The patient ran a completely afebrile course with first-intention healing. Dr. Hill remarked that the case illustrated the value of a routine method of bacteriological investigation and bacteriologically directed chemotherapy. A still higher degree of safety for mother and baby would obtain when bacteriological investigations preceded surgical manoeuvres.

DR. J. G. O'DONOGHUE asked what were the risks of prolapse of the cord when the membranes were ruptured in a *multipara* with an unfixed fetal head. He said that he was in particular agreement about the necessity of adequate stripping up of the membranes and felt that the rapidity of response depended a great deal on that particular point of the technique.

DR. EDWARD R. WHITE asked why the rectal tube had been discarded.

DR. ALISON MACKIE, in reply to Dr. White, stated that in parallel series of 300 cases in which the rectal tube and artificial rupture of the membranes were used there were seven deaths from infection in the rectal tube group, and three in the artificial rupture of the membranes group. When the period of gestation was less than thirty-four weeks the fetal mortality was 70% in both groups. The incidence of prolapse of the cord was four times greater in the artificial rupture of the membranes group, but nevertheless the fetal mortality was 14% less in the artificial rupture of the membranes group when the period of gestation was over thirty-four weeks.

DR. L. W. GLEADELL said that a perusal of the figures seemed to indicate that when delivery was delayed over forty-eight hours the only serious deterioration was in the fetal mortality rate. In view of that he wondered whether or not Cæsarean section, for the sake of the child, would not be a reasonable procedure, particularly as the adequate pre-operative use of chemotherapy made it a relatively safe procedure.

DR. R. ALDER said that he felt that an adequate drainage of liquor was desirable if a rapid onset of labour was to be expected. He asked whether it was justifiable, at the risk of having the cord prolapsed, to push the presenting part out of the brim to allow an adequate amount of liquor to escape.

PROFESSOR B. T. MAYES congratulated the speakers on the excellence of the papers presented. He summarized his own feelings by saying that he felt quite happy about the method in *multipara* and in *primipara* with a "ripe" cervix. He did not like artificial rupture of the membranes in *primipara* with an "unripe" cervix. Post-maturity was such a difficult entity to establish with certainty that he was disinclined to interfere on those grounds alone. He said that he could see no reason why penicillin and sulphonamides should not be used as a routine after artificial rupture of the membranes. Infection had an important bearing on the prognosis for both mother and child and trouble could be well established and harmful before cultural methods had indicated its presence. If, after artificial rupture of the membranes, Cæsarean section became necessary, Professor Mayes felt that it was what had happened in the way of vaginal examinations and attempts at delivery after artificial rupture of the membranes, rather than the actual procedure of rupturing the membrane, that determined the outcome.

DR. LEMMON, in reply to Dr. O'Donoghue, said that there was grave risk of prolapse of the cord, but the figures presented did not show a high incidence of that complication and the risk was amply justified. In reply to Dr. Gleadell he pointed out that many of the foetuses were premature and most were "bad risks", so that too frequent recourse to Cæsarean section was to be deprecated.

Basal Temperature Patterns in Relation to the Sexual Cycle.

DR. J. W. JOHNSTONE read a paper entitled "Basal Temperature Patterns in Relation to the Sexual Cycle" (see page 653).

DR. LORNA LLOYD-GREEN said that, as they knew from their agenda, it was expected that Dr. Fisher, of Adelaide, would have been there to open the discussion on the paper. They very much regretted his absence as the exchange of interstate thought was always very beneficial.

Dr. Lloyd-Green went on to say that she would first like to congratulate Dr. Johnstone on his excellent paper and charts. He had left very little for her to say. In 1904 Van de Velde had first drawn attention to the possible relationship between body temperatures and the different phases of the menstrual cycle. However, little clinical interest had developed until 1933, when Zuck applied it in studies of fertility and sterility. Rubenstein further developed that, and other notable workers in the field, such as Palmer, Martin and Tompkins, had all made valuable contributions which had further clarified the subject.

Most gynaecologists used the rectal site for recording the temperature. Kleitman in 1944 had first suggested the oral route and claimed it to be just as satisfactory, easier to use and much more acceptable to the patient. Davis in 1946 had further emphasized that it was as accurate for the purpose as rectal or vaginal recordings and much less objectionable to the patient. Kaffen suggested intrauterine recordings as more reliable since the uterus was the focus of hormone influence. That was obviously not clinically applicable. Dr. Lloyd-Green had used the oral route throughout her studies and felt that it was quite satisfactory providing certain precautions were taken. It was essential to have standard conditions which should be given to the patient in writing. Every detail had to be followed. The reading should be taken on the patient's awakening in the morning at approximately the same time, while she was still in bed and before moving, eating or smoking. The thermometer should be shaken down so that the mercury was below 96° F. and the mercury tip inserted into the mouth under the tongue where it should remain for two minutes by the clock. It should be read and recorded immediately on a piece of paper lying beside the bed. In addition menstruation, coitus, pain, bleeding, or any intercurrent infection should be noted. Many thermometers were broken if the tip touched the bed clothes when the mercury was being shaken down, and warning of that should be given to the

patient. After use the thermometer should be rinsed in cold water and replaced in its case. Hot water had broken many and others had been knocked off the bedside table. Intelligent patients, in time, could graph their own temperatures, and it was certainly easier to read a chart in graph form than a column of figures. It was necessary to keep a chart for two to three months to get some idea of the individual pattern of the patient. After that length of time a chart kept about the middle week of the cycle would show the temperature shift. Oral temperature readings were on an average one degree lower than rectal temperature readings, but the charts followed the same pattern as those demonstrated by Dr. Johnstone. The range of temperature was from 96° to 98.4° F. The level of temperature shift was usually from 0.5° to 0.9° F.

Various criticisms had been made of temperature chart studies: that they were not accurate records of temperature, they were troublesome to secure, less precise than hormone assays, and less scientific than electric methods. In answer to those points one could say that such readings were accurate enough to be useful; nothing was too much trouble for a patient who really wanted a baby; they were less expensive than hormone assays; and everyone possessed a thermometer, but few possessed a potentiometer. The method was painless, simple and cheap. It did, however, require the cooperation of the patient. Various types of charts had been beautifully illustrated by Dr. Johnstone. The typical chart of an ovulating female was never seen in men or in women before the menarche or after the menopause. Following hysterectomy the biphasic pattern still persisted, but, like Dr. Johnstone, Dr. Lloyd-Green was unable to find any record of charts kept after oophorectomy. One chart showed a temperature pattern remaining constant when the patient was removed to the tropics. Many workers contended that there was a greater incidence of anovular cycles in hot climates. There was no unanimity of opinion as to when ovulation actually occurred, but most workers contended that it coincided with the drop in temperature. Tompkins claimed that coitus must take place within forty-eight hours of the temperature shift for pregnancy to result. In actual practice it would take place at the rise, for the patient would only recognize the lowest point after the rise had occurred. The patients most likely to conceive were those with abrupt temperature shifts and normal patterns. In any patient the day of ovulation in different cycles might vary one day on either side of the apparent fourteenth day preceding menstruation, and if menstruation commenced overnight there might be a twenty-four hour error. Dr. Lloyd-Green said that she would be interested to know if anyone had seen a chart of a patient with a persistent corpus luteum. At the time of speaking she had a patient with a constant temperature of 99° F., whom she did not consider to be eight weeks pregnant on pelvic examination, and in whom a cystic ovary was not palpable. Dr. Lloyd-Green congratulated Dr. Johnstone and his patient who kept a chart for two years; she thought that that must have established a record of great interest. Temperature charts and biopsies always corresponded, but biopsies would only show that ovulation had occurred in one cycle, whereas temperature charts would show that it had occurred, and also when it occurred in many cycles.

Dr. Lloyd-Green went on to say that one might ask if those charts were really of clinical value or merely of interest. There were at present thirteen recognized clinical uses: (i) as an indication of the most fertile period for sterility patients; (ii) as a guide to the best time for artificial insemination; (iii) as showing the unsafe period for those wishing to avoid conception; (iv) to tell if a puerperal patient was ovulating, for as was well known menstruation usually occurred before the onset of ovulation; (v) about the menopause to tell if a patient was ovulating and likely to become pregnant; (vi) as an indication of the pre-ovulatory and post-ovulatory phases in timing endometrial biopsies; (vii) as an aid in assessing the value of treatment intended to stimulate ovulation such as hormone or irradiation therapy; (viii) as an early sign of pregnancy, the so-called "poor man's Friedman test"; (ix) as an aid in the search for early human ova at all stages, unfertilized, fertilized or nidated; (x) as an aid in calculating the period of gestation (thirty-eight weeks from ovulation); (xi) as an indication of imminent abortion in cases of habitual abortion; (xii) as an investigation in some types of irregular bleeding; (xiii) as a control measure in studying the effectiveness of contraceptives.

Dr. Lloyd-Green thought that most gynaecologists would agree that, since ovulation was the central key to the study of fertility, basal temperature charts were essential in the investigation of infertile patients; possibly that idea should be extended to all gynaecological patients. In con-

clusion, she said that she could visualize a race of women who commenced taking their temperatures at puberty and continued until several years beyond the menopause.

Dr. BRUCE ANDERSON stressed the importance of timing intercourse. He said that among a group of patients whom he had questioned intercourse took place once weekly or more in 47% of cases and once weekly or less in 27%. If it was accepted that the sperm was viable for twenty-four hours and the ovum for forty-eight hours, the mathematical probabilities against conception when intercourse took place once weekly were in the region of twenty to one if the patient had a twenty-eight-day cycle. Dr. Anderson said that he had found the basal temperature patterns useful in predicting abortion in patients with the habitual abortion syndrome. A fall in temperature preceded the abortion by a period of time that was usually a week or more.

Dr. FRANK HAYDEN said that careful questioning of patients with *Mittelschmerz* had led him to recognize two types of pain: the first was a pain in one or other iliac fossa, which he regarded as being due to ovulation, and the second, occurring about twenty-four hours later, was a bilateral one which he regarded as being due to tubal colic. In *multiparae* he found symptoms due to prolapse often aggravated around the time that one would calculate ovulation to be occurring.

Dr. J. W. Johnstone, in reply, said that it was his opinion that timing of intercourse was of definite advantage in improving the chances of conception in sterility patients. Next to mechanical disturbances of the tubes by insufflation and radioopaque injections, it was the most useful general measure. He often advised patients to have intercourse three days in succession. As he had shown in the discussion, it was difficult to predict the optimum time for conception in advance from the temperature pattern; more particularly was that so because he believed that the optimum time was before rather than after the shift had occurred. In estimating the time, the variable factors that had to be faced were: whether ovulation occurred more than once in any cycle, to what extent it varied from cycle to cycle, whether extraneous stimuli such as coitus-induced ovulation could occur in the human, as well as the time during which the ovum was capable of fertilization and the sperm was viable in the female environment. As Dr. Anderson had said, there seemed to be in a general way a quantitative relationship between progesterone concentration and the height of the secretory and pregnancy plateaux. A plateau which was poorly sustained or subject to remissions was likely to be associated with poor nidation and a propensity to abortion. In a very evenly maintained chart, like the last one of the series he had shown, the patient was most unlikely to abort. He mentioned that he had seen some patients in whom progesterone seemed to hasten abortion and produced a paradoxical lowering of the temperature. With regard to *Mittelschmerz* he agreed that it was very common if looked for. There was no satisfactory explanation, and as Dr. Hayden said there might be a number of causes. In some cases it was unilateral and tended to alternate from side to side. It could be due to ovarian tension, pelvic congestion, tubal or uterine colic, or blood "spill" as in the patient he had shown. It certainly was common without associated pelvic inflammation. It was easy to see how the symptoms of prolapse could be aggravated at that time. There might even be hormonal factors, as it had been shown by veterinary workers that impaired genital muscular tone with a tendency to prolapse and uterine dysfunction commonly resulted in Australian sheep which were fed on certain pastures of clover which were known to contain the sex sterols in excess. Dietetic factors could also produce genital prolapse in mice.

In conclusion, Dr. Johnstone thanked the members present for their interest and attention, and Professor Bruce Mayes for having come from Sydney to be present at the first meeting of its kind to be held in Australia.

Vaginal Plastic Repair of Prolapse.

Dr. I. HAYES demonstrated an operation for vaginal plastic repair of prolapse.

Dr. J. G. HAYDEN said that most women who had borne children had suffered some degree of weakness of the posterior vaginal wall. In many cases that was insufficient to cause symptoms, but in others the incapacity was such that operation was warranted. It was a good axiom that diagnosis preceded treatment and it was on account of contravention of that rule that they often saw poor results after operation on the posterior vaginal wall. Many patients after a cursory examination were diagnosed as suffering from rectocele, whereas their condition was one of rectocele associated with a hernia of the pouch of Douglas.

Dr. Hayden said that the treatment of deficiencies of the posterior vaginal wall should start at the time of confinement; efficient suturing at that time might obviate operation later on. If a thorough examination of the posterior vaginal wall was made after delivery one was often surprised to find a rather more extensive tear extending up the vagina than had been suspected. Damage to the posterior wall was caused at the time of birth in many cases by unnecessary forceps delivery of the child as soon as the cervix was fully dilated; when that was done, there was substituted for the slow gradual separation of the medial portions of the *levator ani* muscles surrounding the vagina a comparatively sudden delivery of the head through that hiatus. The forcible withdrawal of the head separated the two levators posteriorly where they joined together between the posterior wall of the vagina and the anterior wall of the rectum, thus destroying one of the two natural barriers which existed between the lower part of the rectum and the posterior vaginal wall. The other structure which was damaged was the recto-vaginal septum or layer of endopelvic fascia which completely surrounded the vaginal tube and which in its posterior part received the name of the recto-vaginal septum. A traumatic deficiency of those two structures left no supporting tissue separating the rectal from the vaginal wall, and hence any increase of intra-abdominal pressure would show itself as a bulging forward of the rectum into the lower part of the vagina. After delivery, inspection inside the vagina would often reveal a bilateral tear extending up the vagina. That tear had often gone deep enough through the wall of the vagina and the recto-vaginal septum to isolate the central portion of fascia over the rectum. The isolation of a segment of the fascia cylinder surrounding the vagina would, with separation of the levators, result in a rectocele.

Dr. Hayden went on to say that repair of a rectocele must essentially consist of suturing together the levators between the rectum and vagina—or, as the late Professor Watson, of Adelaide, used to say, "barricading the rectum". When that had been achieved the fascial layer was reconstituted, usually by removing a triangle of redundant mucous membrane and with it the attenuated fascia, so that, when the two sides of the triangle were united, besides mucous membrane, one brought into apposition the edges of strong fascia.

In approaching the levators from the muco-cutaneous junction it was most essential that the right plane was entered. If one was in the right plane a bloodless separation of the rectum and the vaginal wall with closely adherent fascia could be made right up to the cervix. A common mistake was to get into the layers of the rectal wall and to find that one had stripped off the muscular coat of the rectum with the vagina and recto-vaginal septum. That was associated with a good deal of bleeding which obscured the true planes. In fact if one struck much bleeding it was a fair indication that one was in the wrong plane. Besides the danger of entering the rectum there would be the development of a large perirectal and perivaginal hematoma, which Dr. Hayden thought was a commoner post-operative complication than most people thought and was one of the reasons why the post-operative period was so uncomfortable for those patients. Should the rectum be opened it was wise, after closing the hole, not to excise any of the posterior vaginal wall so as not to have a suture line lying over the damaged portion of the rectum. Should a fistula result it would then be a perineal one and not a recto-vaginal fistula. The former was less inconvenient and being a longer track was more likely to heal spontaneously.

Dr. Hayden said that it should be remembered that many operations for rectocele did not give full symptomatic relief because the surgeon had neglected to remove the accompanying hemorrhoids. Most women with rectoceles were constipated on account of the lack of support of the rectal wall, and that led to straining at defecation and the development of hemorrhoids; strengthening the posterior wall was often only half the battle.

The condition with which a rectocele was often confused was a hernia of the pouch of Douglas or enterocoele. The name "vaginal enterocoele" was not new, having been used by a Frenchman, De Garengeot, in 1736, though he was probably referring to a complete prolapse rather than to the specific anatomical cul-de-sac hernia to which Dr. Hayden was referring. A hernia of the pouch of Douglas was either congenital or acquired. Some women were born with an abnormally low peritoneal reflection onto the posterior wall of the vagina and anterior wall of the rectum; in others that was acquired by a combination of raised intra-abdominal pressure and weakness of the endopelvic fascia between the two utero-sacral ligaments as a result of childbirth. The wider the space between them, the more likely was the development of a hernia. As the space between the two

utero-sacral ligaments was normally fairly wide, obstruction of loops of bowel in that type of hernia did not occur and the hernia was easily reduced. As the hernial sac descended it could take up two positions. In the first, which was the more common, it bulged forward and pushed in front of it the posterior fornix and upper part of the posterior vaginal wall and might protrude down the vagina and out through the introitus. Secondly, it might be directed backwards and invaginate the anterior wall of the rectum. Further protrusion would cause the anterior wall of the rectum to prolapse or herniate through the anus. In that way a particular type of prolapse of the rectum might result. The lumen of the prolapsed rectum was directed posteriorly. Moschcowitz had demonstrated that the prolapse developed at the expense of the anterior rectal wall by showing that a finger placed on the rectum against the posterior wall would not stop the mass from prolapsing, whereas if placed against the anterior wall it did. A proper conception of that type of rectal prolapse was essential for its operative cure; when one appreciated that it was an invagination of the anterior rectal wall by the pouch of Douglas, one could see that such methods of treatment as Gabriel's sclerosing injections and Lockhart-Mummery's fixation of the rectum posteriorly were doomed to failure.

A hernia of the pouch of Douglas being a true hernia should be treated according to the three principles that governed all herniae: (i) the sac was opened and the contents returned; (ii) the sac was disposed of; (iii) the supports through which the sac had herniated were built up. The hernia of the pouch of Douglas was attacked from the vagina, though in some cases it was advisable to combine that with an abdominal approach. The posterior vaginal wall should be split from cervix to outlet and the vaginal walls peeled off laterally, with exposure of the anterior wall of the rectum in the lower part of the incision and the hernial sac in the upper part. That sac should be opened and stripped up off the anterior wall of the rectum, ligated and removed. Great care must be taken with the rectum as it was easy to remove part of its anterior wall with the sac if the latter was not carefully stripped up. It must be remembered that those conditions were sliding herniae and in many cases it was very difficult to isolate and tie off a sac. After removal of the sac the space through which the sac had herniated had to be reduced, which meant that the two utero-sacral ligaments must be sutured together. The hernia having been dealt with, the rest of the operation for the rectocele proceeded. When the uterus was being removed vaginally the utero-sacral ligaments could be sutured together easily from their superior surface. When the fundus had been delivered out into the vagina through the utero-vesical pouch, by pulling the fundus down and elevating the bladder with a retractor, the two utero-sacral ligaments were made to stand out and could be easily sutured together along their length.

To deal with the pouch of Douglas in such cases of rectal prolapse as had been mentioned it was necessary to open the abdomen. Bonney's operation was to obliterate the cul-de-sac gradually by a series of purse-string sutures commencing at the bottom and then to suture the sigmoid to the back of the uterus and left broad ligament and to carry out a ventrofixation. Roscoe-Graham's operation was to incise the peritoneum in the cul-de-sac and to strip it right up, care being taken to identify and isolate the ureters. When that had been done the layer of fascia on the upper surface of the *levator ani* muscles was sutured together. The redundant peritoneum of the pouch of Douglas was removed and a very shallow cul-de-sac left. Needless to say the removal of the peritoneal sac and the suture of the pelvic floor from above could be very difficult and very long instruments were required. That operation for rectal prolapse should be accompanied by a simultaneous operation from below. With a second operation in which one opened the posterior vaginal wall and pushed up the pouch of Douglas, its removal from above was made easier and moreover the levators could be brought more satisfactorily together.

Dr. Hayden said that in vaginal plastic operations they were trying to reconstruct anatomy with atrophic and damaged tissues, and hence, even if the anatomical reconstruction was perfect, they might get some recurrence if the weak structures underwent any more atrophy with age as they were prone to do. Remembering that might make them more charitable when they saw conditions that had recurred, for vaginal repair was like the rebuilding of a house. In both cases one might have poor material to work with, and it was on that often rather than on the workmanship that the blame lay for a recurrence.

DR. A. W. HARLEY said that the result of the operation could be unsatisfactory if tightness of the vagina or dys-

pareunia should interfere with normal marital relationships. Tightness of the vagina was usually avoided, but dyspareunia due to an unsatisfactory vaginal entrance was not an uncommon sequel. The operator should endeavour to maintain a funnel-shaped entrance to the vagina, imitating somewhat the vaginal entrance of a *nullipara* in whom there was a moderately short perineum behind the *fossa navicularis*. Often the final result of operation was a long perineum the border of which, forming the posterior part of the vulva, had a sharp edge covered by thick skin which cracked easily on stretching and gave rise to dyspareunia. On that account a better end result followed if in the genital entrance the skin sloped up from the reconstituted perineum to what would be the region of the original hymen.

Dr. Harley said that it was his opinion that better functional results were obtained by a modification of the usual incision which helped to ensure that at the end of the operation the vaginal entrance was more like that found in *nulliparae*. He suggested the use of a short transverse incision with a short incision at an obtuse angle from the ends of this, reaching up to the level of the hymenal remnants, but passing medial to the openings of Bartholin's ducts, which should be identified and not included in any subsequent suturing. The use of that type of incision tended to maintain a funnel-shaped entrance. Following that incision dissection from below upwards exposed the important underlying perineal fibro-muscular tissues and, after the correct plane was found, separation was made up the vagina as far as required. The posterior vaginal flap was divided in the mid-line forming two lateral flaps of which enough was excised to maintain a correct vaginal calibre. At that stage the rectum and levators were exposed and it was then an advantage to insert into the rectum a well-lubricated sponge on a holder. By depressing the handle of the sponge holder the extent of the abnormal forward bulging of the rectum could be appreciated. The fascia overlying the rectum was plicated by vertical or purse-string suture to the required amount and the result was easily checked by attempting to bulge the rectum forward by the use of the sponge holder.

Dr. Harley said that he also believed that the method of suturing the levators had an important bearing on the end result. He thought that they were best sutured by inserting a needle in the upper border of one levator and bringing it out of the lower border and then rethreading the needle on what was the free end of the suture which was brought through the other levator in the same way. If necessary, a second similar suture was inserted. That vertical suturing gave a better result than sutures inserted by passing the needle transversely through the levators as was sometimes done. After suturing the posterior vaginal incision as far as the perineal skin a vertical incision remained. When the incision was opened the fibro-muscular perineal tissues were seen. It was wise to suture that layer by use of a "Z" suture which tended to keep the perineum short.

Dr. BRUCE GRAYZES recalled patients whom he had seen on whom both perineal repair and haemorrhoidectomy had been carried out at the same time and in whom there subsequently developed a recto-vaginal fistula. For that reason he was very averse to carrying out both procedures on the same day.

PROFESSOR B. T. MAYES said that he felt that the possible relationship between early rising in the puerperium and subsequent prolapse was something for which a watch should be kept. He said that early rising had some obvious and immediate advantages, but whether or not it had remote disabilities was something that was yet to be discovered.

British Medical Association News.

SCIENTIFIC.

A MEETING of the New South Wales Branch of the British Medical Association was held on June 17, 1948, at the Royal North Shore Hospital of Sydney, Crow's Nest, New South Wales. The meeting took the form of a series of clinical demonstrations by members of the honorary medical staff of the hospital. Part of this report appeared in the issue of November 27, 1948.

Hashimoto's Disease.

DR. L. S. LOWENTHAL presented a married woman, aged twenty-seven years, who had been admitted to hospital on May 23, 1948, having requested that a swelling in her neck in the thyroid region be removed because of its unsightliness. There was no relevant family history. She had lived most

of her life in Burma, had one child, aged seven years, and had had five miscarriages. Appendicectomy had been performed at the age of eleven years. When she was thirteen years of age, after a severe attack of dysentery she had first noticed a swelling in her neck. She received Lugol's iodine for one month and the swelling went down. Towards the end of her pregnancy (at the age of twenty years) the swelling recurred, but went down about six months later. About one year later, after she had been exposed to a number of bombing attacks, the swelling recurred, and had been present ever since, with periodic further increases in size, the latter being of a subacute nature and associated with a temporary increase in weight. The patient had been of an excitable temperament all her life, and in the last few years had noticed her hands trembling when she became excited. For the preceding six years she had felt listless and mentally depressed and had lost desire for marital relations. In the last four years she had noticed dyspnoea and palpitations on walking uphill, and also that "rather a lot" of her hair had fallen out, and that her hair and skin had become drier. On physical examination the patient was found to have a smooth, rather elastic swelling of the right lobe, and of most of the left lobe of her thyroid gland, which moved freely on swallowing. Tracheal deviation, exophthalmos and eye signs were absent. The pulse was regular and the rate averaged 85 per minute. The palms of the hands were moist but not warm, and the rest of her skin was rather dry. Her hair was not noticeably coarse. Examination of the other systems of her body disclosed no abnormality. A moderate degree of anaemia was present. The patient was thought to have an adenoma of the thyroid, and because of the mild pressure symptoms it was causing (exertional dyspnoea) and for cosmetic reasons it was decided to remove it. At operation the thyroid appeared to show simple hyperplasia, but planes of cleavage were hard to find, and less bleeding occurred than had been expected. Subtotal thyroidectomy was performed. The patient made a speedy and uncomplicated recovery. Microscopic examination of the gland showed the condition to be one of Hashimoto's disease.

Polyposis of the Colon.

DR. LOEWENTHAL discussed the history of a woman, aged 24 years, had been admitted to hospital on January 5, 1948, with a history of diarrhoea (three to five bowel actions per day) for three years, with the passage of blood-stained stools for one month prior to admission. She felt well and had not been losing weight. She was an only child whose father had died of carcinoma of the bowel at the age of fifty-one years, and her mother of the same complaint at the age of forty-four years. The only abnormality revealed on physical examination was a soft cauliflower-like projection on the posterior rectal wall two inches from the anal orifice. Her haemoglobin value was 88%.

Examination after a barium meal showed "no lesion in stomach or duodenum", and after a barium enema "appearances compatible with polyposis of the colon". Sigmoidoscopy was performed, showing the typical appearance of polyposis of the colon, and biopsy taken (and twice repeated) from one suspicious looking area revealed only innocent neoplastic changes. Because of the risk of development of malignancy, it was decided to perform a subtotal colectomy (using the Devine operation). The first stage of the operation was carried out, and then a further biopsy (per sigmoidoscope) revealed adenocarcinomatous change in one of the polypi. Abdomino-perineal resection of the bowel was then considered necessary and was carried out. The patient's condition was satisfactory until ten days after operation, when she developed signs of peritonitis. With parenteral therapy and chemotherapy she recovered from that, only to show a recurrence of the same clinical picture seven days later, and death occurred nineteen days after operation. At autopsy the patient was found to have succumbed to generalized peritonitis. No metastases were detected.

Diaphragmatic Hernia.

DR. LOEWENTHAL's last patient was a coal miner of good general physique, who had been quite well until November, 1946, when he was crushed between the buffers of two sets of coal skips and was admitted to Bulli Hospital with broken left ribs and collapse of the left lung. He was later found to have a diaphragmatic hernia, but was discharged after one month in hospital. At first he had noticed dyspnoea on exertion, but that gradually passed away, and for three months prior to admission to the Royal North Shore Hospital in October, 1947, he had been completely symptomless. At no time did he have any other respiratory, circulatory or alimentary symptoms. On physical examination the patient was found to have the heart displaced one and a half inches towards the right

side of the mediastinum, diminished expansion of the left side of the chest with diminished breath sounds in that area, and borborygmi audible anteriorly over the lower part of the left hemithorax. No abnormality could be discerned on clinical examination of the abdomen. The report on X-ray examination following a barium meal was that there was a large hernia through the left side of the diaphragm. It was mostly posterior, and the hernial sac contained a large portion of the fundus of the stomach, some coils of small bowel, and the splenic flexure. The spleen could not be identified and was probably not herniated. The heart was much displaced to the right. Treatment was undertaken, a preliminary crushing of the left phrenic nerve being carried out, and then five days later, under "Pentothal", cyclopropane and curare anaesthesia, the hernia was repaired: the left pleural cavity was opened after resection of the seventh rib, the hernia (which was found to contain stomach, small bowel, transverse colon and omentum) was reduced, and the diaphragmatic defect was repaired with interrupted black silk sutures. The left lung was then inflated by "plus pressure" under anaesthesia and the pleural cavity closed, except for a tube which was connected to a source of negative pressure suction. The patient was given 50,000 units of penicillin every six hours for nine days post-operatively; the drainage tube (from which there had been very little discharge) was removed after five days. He was allowed to get up fifteen days after operation, when a X-ray examination of his chest had shown the only abnormality to be "pleural thickening at the L base with slight elevation". He was discharged from hospital nineteen days after operation, professing that "he had never felt better". He was seen again in April, 1948, and was quite well.

Vagotomy and Peptic Ulcer.

Dr. E. GOULSTON presented a series of patients who had been treated for peptic ulcer by means of vagotomy. The first, a man, aged fifty-eight years, had undergone gastro-enterostomy for duodenal ulcer in 1926 and then been well till 1946, when characteristic ulcer symptoms recurred and steadily became worse. A diagnosis of anastomotic ulcer was made and infradiaphragmatic vagotomy was performed. He made an excellent recovery from his operation and analysis of a fractional test meal revealed a great reduction in the amounts of total acid and a disappearance of free acid. The second patient, a woman, aged thirty-four years, had a large active penetrating ulcer on the lesser curvature in the middle third of the stomach, which was demonstrated by gastroscopic and X-ray examination. Transthoracic vagotomy was performed, followed a month later by partial gastrectomy and gastro-jejunostomy, with complete relief of symptoms and reduction in the total acid content of her gastric secretion. The third patient, a man, aged sixty-seven years, with a prepyloric ulcer (demonstrated by gastroscopy) which had caused increasingly severe symptoms over a period of ten years, underwent infradiaphragmatic vagotomy and posterior gastro-jejunostomy. He made an excellent recovery and analysis of a subsequent fractional test meal showed the presence of a high resting total acidity with a sharply falling total acid curve, and no free acid; he was discharged from hospital well. The last patient of the series, a woman, aged forty-five years, had an active duodenal ulcer with symptoms for ten years. Infradiaphragmatic vagotomy was performed, together with subtotal gastrectomy and posterior gastro-enterostomy. At the time of the meeting she was making an excellent recovery.

Dr. Goulston discussed the history and physiological basis of the operation of vagotomy and outlined the tests associated with the diagnosis of peptic ulcer and the checking of the efficiency of operation. He gave as the two principal indications for vagotomy, anastomotic ulcer and duodenal ulcers which had failed to respond to prolonged medical treatment and were associated with hypermotility, hypertonicity and hypersecretion. Of the types of operations he stated that the supradiaphragmatic approach was the simpler: the seventh and eighth ribs were resected, the oesophagus was mobilized and deflected into the left side of the chest, and the vagus nerves were identified, ligated with silk and divided. The infradiaphragmatic approach was more difficult, but it had the great advantage of providing access to the stomach for examination and, if it was considered necessary, of allowing combination of the operation with gastro-enterostomy, partial gastrectomy or pyloroplasty. Dr. Goulston stated that it was too early yet to assess the possibility of recurrence, and Dragstedt, who had pioneered the operation, did not permit any rash conclusions. However, the first patients operated on by Dragstedt five years earlier were still well, and there had been no evidence of regeneration of the secretory fibres of the vagi in any case. In Dr. Goulston's own cases the

patients had had no recurrence of their symptoms and the results of their post-operative fractional test meals had been most encouraging.

(To be continued.)

Naval, Military and Air Force.

APPOINTMENTS.

THE undermentioned appointments, changes *et cetera* have been promulgated in the *Commonwealth of Australia Gazette*, No. 157, of November 18, 1948.

AUSTRALIAN MILITARY FORCES. Interim Army.

Australian Army Medical Corps.

130th Australian General Hospital: To be Captain, 11th September, 1948.—VX700063 Aidan Patrick Hanway.

NX502739 Captain (Temporary Major) C. Radeski relinquishes the temporary rank of Major and is transferred to the Reserve of Officers (Australian Army Medical Corps) (2nd Military District), 12th October, 1948.

The following officers are transferred to the Reserve of Officers (Australian Army Medical Corps) (3rd Military District): VX700024 Captain H. G. Cumming, 30th September, 1948, and V9049 Lieutenant L. C. Carew, 29th September, 1948.

Active Citizen Military Forces.

Australian Army Medical Corps.

First Military District.—1/43715 Major T. R. Biggs is appointed from the Reserve of Officers with regimental seniority in accordance with Army seniority, 1st May, 1948. The following officers are appointed from the Reserve of Officers, with regimental seniority in accordance with Army seniority, 1st May, 1948: Captains 1/10316 H. W. A. Forbes, 1/13218 J. W. Woodburn and 1/21022 H. Glyn-Connolly. To be Captains (provisionally), 15th September, 1948: 1/39018 Henry Lindsay John Lusby.

Sixth Military District.—6/5014 Captain D. P. Churton is appointed from the Reserve of Officers with regimental seniority in accordance with army seniority, 1st May, 1948.

Reserve Citizen Military Forces.

Australian Army Medical Corps.

2nd Military District.—The following officers are retired at their own request: Majors N. J. Clements, 26th August, 1948, G. S. Flynn and C. W. Furner, 1st September, 1948, T. W. Freeman, 31st August, 1948, A. M. B. Grant, 22nd September, 1948, and M. D. H. Harpur, 15th September, 1948, Captains D. S. Atkins, 26th August, 1948, R. F. Back, 31st August, 1948, G. A. Chambers and D. H. Cohen, 26th August, 1948, R. E. Dunn, 15th September, 1948, T. Galbraith, 24th September, 1948, N. A. Gordon, S. B. Hatfield, A. H. Hodge and T. A. G. Holmes, 22nd September, 1948, Honorary Captains P. D. Blaxland, C. P. Callas and J. E. Carroll, 26th August, 1948, R. A. Craven, 31st August, 1948, N. E. Davis, 7th September, 1948, and J. A. Holt, 22nd September, 1948.

ROYAL AUSTRALIAN AIR FORCE.

Citizen Air Force: Medical Branch.

The appointment of Temporary Squadron Leader L. O. Comino (277539) is terminated on demobilization, 15th October, 1948.

Reserve: Medical Branch.

Leftier Peter Comino (277539) is appointed to a commission with the temporary rank of Squadron Leader, 16th October, 1948.

The appointment of Flight Lieutenant G. P. Cromie (257501) is terminated, 22nd October, 1948.

Australian Medical Board Proceedings.

QUEENSLAND.

THE undermentioned have been registered, pursuant to the provisions of *The Medical Acts*, 1899 to 1946, of Queensland, as duly qualified medical practitioners:

Colville, Leslie Charles George, M.B., B.S., 1941 (Univ. Melbourne), c/o Dr. J. Legg, Biarra Street, Yeerongpilly, Brisbane.

Macaulay, Amy Flora Jessie, M.B., B.S., 1947 (Univ. Sydney), c.o. Brisbane and South Coast Hospitals Board, Brisbane.
 Fitzhardinge, Grantley William, M.B., B.S., 1944 (Univ. Sydney), 60, Lang Road, Centennial Park, Sydney.
 Richardson, Eleanor Mary, M.B., B.S., 1947 (Univ. Sydney), c.o. Medical Staff, Hospitals Board, Cairns.
 Jaconelli, Joseph, M.B., B.S., 1947 (Univ. Sydney), c.o. Hospitals Board, Ayr.
 Reid, Colin Campbell, M.B., B.S., 1947 (Univ. Sydney), c.o. Hospitals Board, Cairns.
 Rothfield, Neville John, M.B., B.S., 1945 (Univ. Sydney), Townsville Hospital, Townsville.

Dominations and Elections.

THE undermentioned have applied for election as members of the New South Wales Branch of the British Medical Association:

Wilkins, Trevor Douglas, M.B., B.S., 1948 (Univ. Sydney), Royal North Shore Hospital, St. Leonards.
 Wonders, Ivor Herbert Richard, M.B., B.S., 1948 (Univ. Sydney), Royal North Shore Hospital, St. Leonards.

THE undermentioned have been elected as members of the New South Wales Branch of the British Medical Association:

Abbott, Lewis George, M.B., B.S., 1946 (Univ. Sydney), Box 98, G.P.O., Broken Hill.

Blumer, Mary Alison, M.B., B.S., 1948 (Univ. Sydney), Balmain and District Hospital, Balmain.

Charlton, William James, M.B., B.S., 1948 (Univ. Sydney), Royal North Shore Hospital, St. Leonards.

Hilliard, Eric Raymond, M.B., B.S., 1948 (Univ. Sydney), District Hospital, Parramatta.

Horne, Terence William, M.B., B.S., 1948 (Univ. Sydney), Royal Prince Alfred Hospital, Camperdown.

Hunter, Alan Arthur, M.B., 1948 (Univ. Sydney), Royal Prince Alfred Hospital, Camperdown.

Lancken, Jack Herbert, M.B., B.S., 1948 (Univ. Sydney), Royal Prince Alfred Hospital, Camperdown.

Lewin, Peter Henry, M.B., B.S., 1948 (Univ. Sydney), Orange Base Hospital, Orange.

McEwen, Betty Jean Harvard, M.B., B.S., 1948 (Univ. Sydney), Royal Prince Alfred Hospital, Camperdown.

Morton, Marion Beatrice, M.B., B.S., 1948 (Univ. Sydney), Royal Prince Alfred Hospital, Camperdown.

Munro, Robert Rutherford, M.B., B.S., 1948 (Univ. Sydney), St. George Hospital, Kogarah.

Proust, Anthony John Paul, M.B., B.S., 1948 (Univ. Sydney), 3, Highview Avenue, Neutral Bay.

Stevenson, Malcolm Keith, M.B., 1947 (Univ. Sydney), 39, Russell Street, Watson's Bay.

Wallace, David Charles, M.B., B.S., 1948 (Univ. Sydney), Sydney Hospital, Sydney.

Weaver, Judith, M.B., B.S., 1948 (Univ. Sydney), District Hospital, Bathurst.

Zamel, Jack, M.B., B.S., 1948 (Univ. Sydney), Orange Base Hospital, Orange.

THE undermentioned has been elected a member of the South Australian Branch of the British Medical Association:

Anderson, Donald Robert Ross, M.B., B.S., 1947 (Univ. Adelaide), 318, Military Road, Semaphore, South Australia.

Obituary.

JOHN MAUNSELL.

We regret to announce the death of Dr. John Maunsell, which occurred on November 11, 1948, at Newmarracarra, Geraldton, Western Australia.

Medical Appointments.

THE undermentioned appointments have been made at the Royal Alexandra Hospital for Children, Camperdown, Sydney: Honorary Radiologists, Dr. B. P. Anderson Stuart and Dr. E. W. Frecker; Honorary Assistant Radiologist, Dr. F. J. McEncroe; Honorary Physician, Dr. R. A. R. Green; Honorary Assistant Physicians, Dr. S. G. Bradfield and Dr. D. G. R. Vickery; Honorary Anesthetist, Dr. A.

Distin Morgan; Honorary Neurologist, Dr. E. L. Susman; Honorary Physician in Charge of Psychiatric and Child Guidance Clinic, Dr. D. W. H. Arnott; Honorary Ophthalmic Surgeons, Dr. N. M. Gregg and Dr. L. Stanton-Cook; Honorary Urologist, Dr. J. W. S. Leadley; Honorary Assistant Urologist, Dr. M. S. S. Earlam.

Diary for the Month.

DEC. 7.—New South Wales Branch, B.M.A.: Executive and Finance Committee, Organization and Science Committee.

DEC. 8.—Victorian Branch, B.M.A.: Council Meeting.

DEC. 9.—New South Wales Branch, B.M.A.: Branch Meeting.

DEC. 10.—Queensland Branch, B.M.A.: Annual Meeting.

DEC. 14.—New South Wales Branch, B.M.A.: Ethics Committee, Medical Politics Committee.

DEC. 17.—Queensland Branch, B.M.A.: Council Meeting.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Honorary Secretary, 135, Macquarie Street, Sydney): Australian Natives' Association; Ashfield and District United Friendly Societies' Dispensary; Balmain United Friendly Societies' Dispensary; Leichhardt and Petersham United Friendly Societies' Dispensary; Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney; North Sydney Friendly Societies' Dispensary Limited; People's Prudential Assurance Company Limited; Phoenix Mutual Provident Society.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federal Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute; Brisbane City Council (Medical Officer of Health). Members accepting LODGE appointments and those desirous to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178, North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205, Saint George's Terrace, Perth): Wiluna Hospital; all Contract Practice appointments in Western Australia. All government appointments with the exception of those of the Department of Public Health.

Editorial Notices.

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